THE PREVALENCE OF ASYMPTOMATIC PHARYNGEAL GONORRHEA AMONG MEN WHO HAVE SEX WITH MEN ATTENDING STD OP AT GOVERNMENT RAJAJI HOSPITAL , MADURAI.

Dissertation submitted in partial fulfillment of the university regulations for

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(BRANCH XX)
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DECLARATION

I, **Dr.C SUGANYA,** solemnly declare that the dissertation titled **"THE PREVALENCE OF ASYMPTOMATIC PHARYNGEAL GONORRHEA AMONG MEN WHO HAVE SEX WITH MEN ATTENDING STD OP AT GOVERNMENT RAJAJI HOSPITAL, MADURAI"** is a bonafide work done by me at Government Rajaji Hospital during 2016 to 2019 under the guidance and supervision of **Prof. Dr. R.SUGANTHY RAJAKUMARI M.D.,** Professor and Head of the Department of STD, Madurai Medical College, Madurai. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree and diploma to any university, board either in India or abroad. The dissertation is submitted to The Tamilnadu Dr.M.G.R. Medical University, towards partial fulfilment of requirement for the award of **M.D.Degree in Dermatology, Venereology and Leprosy (BRANCH XX).**

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CONTENTS

ABBREVIATIONS

MSM	-	Men having sex with Men
HIV	-	Human Immunodeficiency Virus
NACO	-	National AIDS Control Organisation
NACP	-	National AIDS Control Program
STD	-	Sexually Transmitted Diseases
STI	-	Sexually Transmitted Infections
AIDS	-	Acquired Immunodeficiency
RMP	-	Reduction modifiable protein
LOS	-	Lipo oligosaccharides
DGI	-	Disseminated gonococcal infection
NAAT	-	Nucleic Acid amplification test
CDC	-	Centers for Disease Control and Prevention
GISP	-	Gonococcal Isolate Surveillance Project
PID	-	Pelvic inflammatory disease

INTRODUCTION

Gonorrhea caused by an obligate human pathogen Neisseria gonorrhoeae, is the second most prevalent bacterial STD globally. In India, the prevalence of gonorrhea among STI clinic attendees in different regions varies from 3% to 19% [1].

The clinical spectrum of the disease may extend from asymptomatic mucosal colonisation to frank inflammatory mucosal disease. Neisseria gonorrhoeae colonises and infects mucosa of urogenital, anorectal , pharyngeal and ocular regions causing urethritis, cervicitis, proctitis, pharyngitis, and conjunctivitis respectively.

If untreated or inappropriately treated , urogenital infections may spread to upper genital tract and cause local complications such as salphingitis, pelvic inflammatory disease, epididymitis and even serious complications like disseminated gonococcal infections (DGI) , arthritis , dermatitis, endocarditis and meningitis.

Gonorrhea may lead on to complications like ectopic pregnancy, infertility, blindness due to ophthalmia neonatorum. Gonorrhea significantly facilitates HIV transmission through increased viral shedding from inflamed mucosa.Most worryingly the bacteria is developing resistance to the anti microbials introduced for the treatment.

Pharyngeal gonorrhea

Oropharyngeal infections has been reported in about 3-7% of heterosexual men and 10-25% [2] of Men having sex with men(MSM). Pharyngeal gonorrhea is common among sexually active,Men having sex with men and may therefore, serve as an important reservoir for infection at genital sites. The symptoms are usually mild or absent in 90% of cases. In few instances acute tonsillitis or pharyngitis may occur. Pharyngeal gonorrhea is most often asymptomatic, with no significant relationship with sore throat symptoms.

Pharyngeal gonorrhea is far more prevalent than rectal or urethral gonorrhea. Pharyngeal gonorrhea may be a risk factor for developing Disseminated gonococcal infection. Pharynx is also the reservoir of antimicrobial resistant gonococci.

Men having sex with men and Gonorrhea

Men having sex with men (MSM) are one of the high risk group targeted by National AIDS Control Organisation (NACO) to reduce human immunodeficiency virus (HIV) transmission. NACO estimates that India is home to 2.5 million MSM[3] of which 1,00,000 are at high risk of contracting HIV due to multiple partners and commercial sexual practices. Already, 15% of this community is infected with this disease. Only few Indian studies have looked into pattern of STI among Men having sex with men . In contrast, large numbers of studies on STD profile of Men having sex with men are present from the western world.

In most of the cases, bisexual behaviour is commoner than isolated homosexual behaviour. This bisexual behaviour makes MSM a bridge population for spread of STDs and HIV. The National AIDS Control Organisation (NACO) also provides STI treatment guidelines including syndromic management for the general population and presumptive treatment for high risk groups like Men having sex with men. Men having sex with men are now increasingly being recognised in India as a group ,who are at increased risk for HIV and other STIs.

The most common STDs recorded in Men having sex with men are Syphilis (27%) Condyloma Acuminata (21%), Herpes genitalis (19%) and Gonococcal infection (11%) .Gonococcal infections are the fourth most common STD among Men having sex with men.

Prevalence of asymptomatic Gonorrhea and Chlamydia is high among Men having sex with men. Rectum and pharynx serve as reservoir of asymptomatic gonococcus in MSM. Asymptomatic nature of gonococcus among Men having sex with men are alarming , serving them as reservoirs for gonorrhea at other sites. So screening among Men having sex with men in pharynx based on exposure history can be done for early diagnosis and treatment and to prevent further transmission.

In this study, efforts have been made to the study the **Prevalence of asymptomatic Pharyngeal gonorrhea among men who have sex with men attending STD op at Government Rajaji hospital , Madurai.**

REVIEW OF LITERATURE

HISTORY

Gonorrhea is one of the oldest known sexually transmitted disease of the human. Gonorrhea was known by the authors of the Bible. The Book of Leviticus describes a person with urethral discharge. Proclamations that infected persons were to keep themselves away from others for 7 days, may indicate that they already knew that the mean incubation period was7 days[2].

Hippocrates(460-377BC) wrote in fifth centuries about acute gonorrhea as "strangury" and it resulted from "the pleasures of Venus". The synonym "Clap" was derived from the district of prostitution called "Les Clapier" in Paris.

The Roman physician Celsus (25BC -50AD) was aware of gonorrhea and he said "there is a fault in the genital region known as shedding of semen without sexual desire". He treated the complications by catheterizing the patients suffering from urethral stricture. Greek physician Galen (130-200AD) coined the word gonorrhea, which means "gono -seed" and "rrhea-flow".

Swiss physician Paracelsus (1493-1541AD) considered syphilis and gonorrhea as same disease and called it as "French Gonorrhea". John Hunter

(1728-1793) a Scottish surgeon told that there was only one venereal poison and if it fell on mucosal surface it would cause gonorrhea, if it fell on skin it would cause chancre and if it was absorbed into circulation it causes constitutional syphilis[4]. He carried out an experiment in 1767 in which he inoculated a recipients glans and prepuce with material from gonorrhea patient, a chancre appeared 10days later with associated inguinal lymphadenopathy and generalized skin rash. This experiment convinced Hunter that he was able to produce syphilis by inoculation of gonorrheal pus.

Later Philippe Ricord (1800-1889 AD) described that syphilis and gonorrhea were different diseases and he concluded that reinoculation of gonorrhea pus will not induce a chancre[5]. The causative organism Neisseria gonorrhoeae was discovered by Albert Ludwig Sigesmund Neisser in 1879. Culture of N. gonorrhoeae was first described by Leistikow and Luffler in 1882 and it was improved in 1964 by Thayer and Martin, who devised selective growth conditions on special agar plates[6].

Early treatment for urethral gonorrhea was zinc sulphate[2]. Later silver nitrate was used . Irrigation with potassium permanganate was introduced by Weiss in 1880. Sulfonamides were first introduced in 1937 by Gerhard Domagk and penicillin in 1943 for gonorrhea therapy.

GONORRHEA EPIDEMIOLOGY

It is estimated that there are around 106 million new cases each year worldwide, with a prevalence of 36 million[7] cases. Globally, there is a

general lack of STI surveillance in some high risk groups such as sex workers and men who have sex with men (MSM), leading to significant under reporting. World Health Organization estimates that gonorrhea accounted for 18% of the new cases of curable STIs worldwide in 1999. Out of these, 27 million cases occurred in South and South East Asia. In India, among STD clinic attendees, the prevalence ranges from 3% to 20% of all cases[8].

In recent years, a perceptible decline in the number of cases has been recorded in STD clinics across the country, which may be attributed to improved medical facilities at the primary health level, indiscriminate use of over the counter (OTC) antibacterial drugs for unrelated illnesses, prophylactic use of antibiotics after sexual exposure and growing awareness about AIDS in the Indian population[9,10]. Gonococcal urethritis has been demonstrated to increase seminal HIV shedding eightfold in co infected men, with 0.7log HIV RNA/mL decreases when men were treated with effective antibiotics[11].

BIOLOGY OF NEISSERIA GONORRHOEAE

Neisseria gonorrhoeae belongs to the family Neisseriaceae. Neisseria gonorrhoeae is a gram negative diplococcus, aerobic capnophilic, non-flagellated, non-sporulating, oxidase and catalase positive. N.gonorrhoeae is 1.25×1.6×0.8 micrometre^2 in size. They are concave, typically reniform or pear shaped organism.The organism is usually present intracellularly in the polymorphonuclear leucocytes.

Of the members of Neisseriaceae, N.gonorrhoeae and N.meningitidis are pathogenic but N.catarrhalis, N.pharyngis sicca, N.lactamica and N.subflava are usually non-pathogenic[12]. These can be differentiated by sugar fermentation and fluorescent techniques. Structure of N. gonorrhoeae consists of a capsule, trilaminar membrane and pili[13]. Capsule contains polyphosphate.

The trilaminar membrane contains

1. Outer membrane
2. Peptidoglycan layer
3. Cytoplasmic membrane

Outer membrane contains proteins, phospholipids, and lipo oligosaccharides(LOS). Outer membrane proteins are type 1 protein or Por and type 2 protein or Opa. PorA and PorB mediate invasion and penetration of host cell by gonococcus. Opa protein mediates adhesion to epithelial cells via CD66 Opa receptors.

Other important protein involved in pathogenesis is RMP (Reduction modifiable protein). Peptidoglycan layer contains muramic acid and N acetyl glucosamine, antibiotics like Penicillin and Cephalosporins inhibits its synthesis.Cytoplasmic membrane contains penicillin binding protein. Pili are filaments important for attachment of gonococci to mucosal surface. Long pili are pathogenic, whereas short pili are non pathogenic.

Auxotyping

Auxotyping is a method used to differentiate gonococcal strains based on their ability to grow on chemically defined media [14]. A strain unable to grow on chemically defined media lacking proline was designated as Pro-, and a strain unable to grow without arginine was designated as Arg-[15].

Auxotype AHU- (Arginine , hypoxanthine ,uracil) are of importance because of

- Resistance to killing
- Ability to develop asymptomatic male urethral infection
- Propensity to develop Disseminated gonococcal infections[16]

Serotyping

Serotyping was based on typing of monoclonal antibodies specific for various epitopes on outer membrane protein I (P.I, or Por)[17]. Por occurs in two immunochemically distinct serogroups PI.A and PI.B. By employing a set of monoclonal antibodies against PI.A strains and another against PI.B strains, we can subdivide each of the serogroups into a variety of serovars (e.g., P.IA-6, P.IB-1), differing in their ability to react with certain members of the panel of monoclonal antibodies[15,17].

By combination of auxotyping and serotyping gonococci can be divided into over 70 different strains[18,19]. This has been used to follow the evolution of strains in communities over time[20] and also to document mixed infection by different strains.

Genotyping

It is impractical to undertake full genomic sequencing in gonococcus. Opa typing used opa-based PCR primers to generate DNA from each of the approximate 11 opa genes[21]. It can be used in conjunction with other strain typing systems.

PATHOGENESIS

The incubation period varies from 1–14 days, with an average of 2–5 days. Primary infection commonly occurs in columnar epithelium of the urethra , paraurethral glands, bartholin ducts, cervix, rectum and conjunctiva. Neisseria gonorrhoeae strains display high degree of heterogenecity both genetically and phenotypically due to

- Excessive genetic exchange results in recombination of partial or complete genes
- High mutational frequency
- Phase variable genes

These properties make bacteria effective in persisting without severely damaging the host producing mildly symptomatic or asymptomatic infection [22].

Female urethra escapes infection, due to its lining with stratified squamous epithelium. The male urethra is lined with columnar epithelium which favours the penetration of gonococcus.

Penetration of organisms occurs in three steps

1. Adherence
2. Invasion
3. Tissue damage

Gonococcal Structures involved in Pathogenesis

1. Por - helps in insertion into host cell membrane and it is the target for bactericidal, opsonic antibodies
2. Opa - helps in adherence
3. Rmp - is the target for blocking antibodies
4. Pili - helps in adherence and resistance to neutrophils
5. Lipo oligosaccharide -is a tissue toxin and target for bactericidal, chemotactic antibodies
6. Peptidoglycan – is a tissue toxin
7. Iron repressible proteins - helps in iron uptake from transferrin, lactoferrin, hemoglobin.
8. IgA1 protease – helps to escape from mucosal IgA1

Pili

Pili are the most important part of the gonococcus from the pathogenic point of view that are involved in the attachment, invasion and injury of the host and serve as targets for host immune defences.The cell receptor for binding pili is CD46 molecule[23,24].

The structure of the pilin subunit is assessed by x-ray crystallography[25].Viewed by electron microscopy, pili are arranged in individual

fibrils or fibrillar aggregates and cover virtually the entire outer cell surface of the organism.

Pili undergo two types of antigenic variation, in which strains shift antigenic type of their pilus and phase variation and strains switch between P+ and P– states.

Adherence

Two adherence ligands are well documented to be important are pili and Opa. Porin and LOS are also involved in adherence. Piliated gonococci adhere better to human columnar epithelial cells than to squamous cells and to human cells better than to non human cells. Antibodies against pili decrease adherence of piliated gonococci to epithelial cells and red bloodcells[26-28].

Gonococci expressing certain Opa proteins adhere better than Opa^- (transparent) gonococci to various cells, and a monoclonal antibody raised against one Opa protein inhibits adherence[29,30].Gonococci invade the host cell by evading host defense[31]. Pili and Opa helps in adherence.Other proteins involved in adhesion are iC3b,LOS,OmpA and porB.

Invasion

Following adherence, the organism is enfolded by pseudopods and pinocytosed by the epithelial cells where it divides and multiplies. Intracellularly, the organisms are resistant to immune attack. Gonococcal invasion is mediated by Por proteins. After adherence, the Por protein is translocated from the bacterial cell membrane to epithelial cell membrane. Gonococci are able to multiply and divide intracellularly, although they donot invade laterally between cells[32,33].Eventually

some of the gonococci exit from the basal surface of the cell by a process termed exocytosis[33].

Inside the epithelial cell, gonococci are immune to attack by antibody, complement and neutrophils. Their ability to survive to some degree inside epithelial cells suggests that they might be considered as facultative intracellular parasites.

Tissue damage

Gonococci produce a variety of extracellular products that might damage host cells like enzymes (phospholipase, peptidases, and others) but no true extracellular protein toxin has been identified. Tissue damage appears to be due to two structural components of the cell surface , LOS and peptidoglycan. Following adherence to non-ciliated mucosal cells, it damages the adjacent ciliated cells. Cocci are exocytosed into the submucosal region where they elicit a severe neutrophilic response and form microabscesses followed by exudation of purulent material into the lumen of the infected organ. The Lipooligosaccharide antigen elicits the C5a dependant chemotactic response.

When the attack is prolonged, there is proliferation of the columnar and cuboidal epithelium with subsequent formation of stratified layers at later stages. Eventually results in keratinization and fibrosis leading to stricture formation. Gonococcal peptidoglycan fragments may be involved in the pathogenesis of inflammatory arthritis after bacteremic disease[34], similar to the role

of peptidoglycan fragments in a well-studied animal model of poststreptococcal arthritis[35].

Immunity

There is partial acquired immune response to infection, as evident by spontaneous regression and cure in untreated individuals. Both humoral and cell-mediated types of immune responses are demonstrated against gonococcal infection.

Serum resistance

The ability to resist the killing activity of antibodies and complement in normal human serum is closely related to the ability of gonococci to cause bacteremic illness with or without septic arthritis. Most gonococci isolated from the blood stream of patients are resistant to killing by serum from normal previously uninfected volunteers, whereas approximately two-thirds of isolates from mucosal infections are sensitive to killing by normal human serum[36].The bactericidal activity of normal human serum for many gonococci results from previous exposure to common antigens shared by gonococci and other commensal bacteria.

Mechanisms for Evasion of Host Defenses

Following proteins are involved in evasion of Host Defenses

1. Pili
2. Opa
3. LOS

4. Blocking antibodies
5. Rmp
6. Antibody cleavage
7. IgA1 protease
8. Antigen release
9. Membrane blebs
10. Intracellular growth(Facilitated by Por,certain Opas, short LOS)
11. Molecular mimicry (LOS)
12. Sialylation (serum-bactericidal resistance)

DISEASE TRANSMISSION

Neisseria gonorrhoeae is an obligate parasite and humans are the only natural reservoir. Neisseria gonorrhoeae is transmitted by direct human to human contact between mucosal surfaces of urogenital tract, anal canal and oropharynx during sexual activity . Efficacy of transmission from infected female to uninfected male is 20% and from infected male to uninfected female is 50-90%[37,38].Transmission of infection from pharynx to urethra can occur[39].

Neonates can be infected while passing through birth canal if mother has urogenital gonorrhea, this non sexual mode of transmission causes ophthalmia neonatarum.Gonococci survive only a short time outside the human body. Although gonococci can be cultured from a dried environment such as toilet seat up to 24 hours after being artificially inoculated in large numbers , there is virtually no evidence that natural transmission occurs from toilet seats or similar objects.

CLINICAL MANIFESTATIONS

Asymptomatic infections	Symptomatic infections
1. Urethra 2. Cervix 3. Pharynx 4. Rectum	1. Urethritis 2. Cervicitis 3. Bartholinitis 4. Balanoposthitis 5. Proctitis 6. Pharyngitis 7. Conjunctivitis 8. Vulvovaginitis

COMPLICATIONS

Male	Female
1. Epididymitis 2. Lymphangitis 3. Penile edema 4. Periurethral abscess 5. Prostatitis 6. Phimosis 7. Paraphimosis 8. Tysonitis,Littritis,Cowperitis 9. Seminal vesiculitis 10. Trigonitis 11. Watering can perineum 12. Sterility	1. Bartholin abscess 2. Pelvic inflammatory disease 3. Lymphangitis 4. Skeinitis 5. Parametritis 6. Cystitis 7. Infertility

SYSTEMIC COMPLICATIONS

1. Disseminated gonococcal infections
2. Endocarditis
3. Myocarditis
4. Pericarditis
5. Meningitis
6. Pneumonitis
7. Hepatitis
8. Fitz Hugh Curtis syndrome
9. Pyelonephritis
10. Tenosynovitis
11. Septicemia

GONORRHEA IN MEN

Anterior urethritis is the most common manifestation of gonorrhea in men. It produces profuse thick and purulent discharge with intense burning and pain during micturition[40,41]. It is associated with meatal edema and perimeatal erythema. Tender inguinal lymphadenopathy may be present.

Without treatment, the usual course of gonococcal urethritis is spontaneous resolution over a period of several weeks. Before the development of effective antimicrobial therapy, 95% of untreated patients became asymptomatic within 6 months[40].Subsequent asymptomatic carriage of N. gonorrhoeae may occur .

If anterior urethritis is not treated posterior urethritis may develop presenting as frequency and urgency of micturition ,strangury and occasional tenesmus. Painful erection and few drops of blood at the end of micturition may be noticed[42].

Acute gonococcal infection may involve Tyson and Littre glands. Acute Tysonitis presents as pea sized unilateral or bilateral erythematous or tender swelling on either side of the frenulum. It may rupture spontaneously discharging pus with gonococci. Periurethral (Littre) gland involvement results in small follicular abscess in urethral wall , that coalesce to form large abscess that infiltrate corpus spongiosum leading to painful erection or ventral angulation of penis. Gonococcal balinitis may rarely occur in uncircumcised men.

In men, the most common local complication of gonococcal urethritis is epididymitis[43]. Infection occurs either by lymphatic spread or as a result

of retrograde passage of urine secondary to urethra vesicular irrigation , vigorous prostatic massage , urethral instrumentation , or excessive sexual indulgence. Usually it affects lower pole of epididymis and presents with unilateral testicular pain , swelling associated with inguinal pain and most patients with gonococcal epididymitis have overt urethritis when they present. A close differential diagnosis is testicular torsion, which is a surgical emergency.

Other complications include acute cowperitis and seminal vesiculitis. Acute cowperitis presents as pain and heaviness in the perineum associated with frequency of micturition or pain on defecation.Seminal vesiculitis is associated with painful penile erection and ejaculation or occasionally blood stained semen. Postinflammatory urethral strictures were common complications of untreated gonorrhea in the preantibiotic era but now they are rare.

COMPLICATED UROGENITAL INFECTIONS IN MEN

Even in the absence of appropriate treatment , spontaneous resolution occurs in majority of urogenital infections within 4-6weeks, 95% of cases become asymptomatic within 6 months. In rare instances if patient goes untreated or in appropriately treated , serious sequelae may occur.

Urethral strictures may be annular or diaphragmatic affecting lower segment. Bulb of the urethra is most frequently infected part although any part may be involved. Urethral mucosa appears pale and firm in the affected part. It can be detected by urethroscopy or urethrogram.

GONORRHEA IN WOMEN

The endocervical canal is the primary site of urogenital gonococcal infection in women. Urethral colonization is present in 70–90% of infected women,[44,45,46]but is uncommon in the absence of endocervical infection. However after hysterectomy,the urethra is the usual site of infection[47].Only 50% of infected females are symptomatic[48].

The most common symptoms of lower genital tract infections in women are increased vaginal discharge, dysuria, inter menstrual uterine bleeding and menorrhagia each of which may occur alone or in combination and may range in intensity from minimal to severe[49,50].

Although the physical examination may be normal, many infected women may have cervical abnormalities like purulent or mucopurulent cervical discharge, erythema and edema of the zone of ectopy, and mucosal bleeding that is easily induced by swabbing the endocervix[50].

Local complications include inflammation and uncommonly, abscess formation in the paraurethral glands (Skene's glands) and Bartholin's glands. Bartholin's gland abscess is the most common urogenital complication of gonorrhea in women[51]. Bartholin's gland abscess is painful and examination shows a tender red cystic swelling of the posterior half of the labium majus. In less acute cases, chronic inflammation can cause palpable thickening of the glands.

About 10%–20% of women develop ascending infection leading to pelvic inflammatory disease. Coexisting cervical or vaginal infections with Chlamydia trachomatis, Trichomonas vaginalis, Candida albicans, herpes simplex virus, and a variety of other organisms can occur.

The manifestations of gonorrhea during pregnancy are not significantly different from those in nonpregnant women except that pelvic inflammatory disease (PID) is probably less common and pharyngeal infection appears to be more prevalent than in nonpregnant women[51].

Complications of gonorrhea in pregnancy include

- Spontaneous abortion
- Premature rupture of fetal membranes
- Premature delivery
- Acute chorioamnionitis
- Pharyngeal infections
- Ophthalmia neonatorum, Disseminated gonococcal infections and scalp abscess in the newborn.

In acute PID, the clinical syndrome comprised of salpingitis , endometritis and tubo ovarian abscess or pelvic peritonitis is the most common complication of gonorrhea in women, occurring in an estimated 10–20% of those with acute gonococcal infection[52,53].

PID is the most common of all complications of gonorrhea, as well as the most important in terms of public-health impact, because of both its acute manifestations and its long term sequelae like infertility, ectopic pregnancy, and chronic pelvic pain. Patients with gonococcal salpingitis usually presents with various combinations of lower abdominal pain, dyspareunia, abnormal menses, intermenstrual bleeding, or other complaints compatible with intra abdominal infections[54].

On physical examination, these patients usually have lower abdominal, uterine or adnexal tenderness, cervical motion pain, abnormal cervical discharge, and sometimes an adnexal mass or tubo-ovarian abscess. Other findings that may or may not be present are fever, leukocytosis, elevation of the erythrocyte sedimentation rate and increased levels of C-reactive protein. Women with gonococcal salpingitis often appear more acutely ill than women with nongonococcal salpingitis, they are more often febrile (74 vs. 22%) and are more likely to present during the first 3 days of symptoms (32 vs. 15%)[55].

Fitz–Hugh–Curtis syndrome

Gonorrheic perihepatitis (Fitz–Hugh–Curtis syndrome) is the inflammation of the adjacent peritoneal area, an infrequent complication in which

symptoms of PID accompanied by pain in the right upper quadrant that mimics acute cholecystitis occurs.

PHARYNGEAL GONORRHEA

Oropharyngeal infections are reported in 3-7% of heterosexual men,10-25% of infected MSM and 10-20% of infected women[56,57,58]. Pharynx was the sole site of infection in less than 5% of patients irrespective of gender or sexual orientation[59]. Changed sexual behaviour, more frequent oral sex during last decades have increased these figures.

Infection is transmitted by orogenital contact. Symptoms are usually absent or mild in 90% of cases. Few cases may develop acute pharyngitis, tonsillitis associated with fever and lymphadenopathy[60,61,62]. Pharyngeal gonorrhea may be a risk factor for developing disseminated gonococcal infection[61] .

Pharyngeal gonorrhea may be self limiting, with up to 50% of cases detected by culture. All cases of Pharyngeal gonorrhea spontaneously remit within 3 months[63,64]. Pharyngeal infection has a spontaneous rate of clearance close to 100% at 12 weeks[65,66].

Oropharyngeal asymptomatic carriage of gonococci is more common, found in around 4% of those attending clinics for sexually transmitted diseases[67]. Untreated gonococcal infections could result in the development of multidrug resistant gonorrhea.

ANORECTAL GONORRHEA

The rectal mucosa is infected in 35–50% of women with gonococcal cervicitis and it is a frequent site of infection in homosexual men. It is the only site of infection in 5% of women with gonorrhea and 40% of homosexually active men studied prior to recognition of the HIV epidemic[68-71].

Gonococcal proctitis occurs in passive MSM from anal Coitus[72]. In women , rectal mucosa is infected from infected cervical secretions. Symptoms are anal pruritus, painless mucopurulent discharge, scant rectal bleeding and tenesmus. Proctoscopy reveals red edematous and friable rectal mucosa that bleeds easily. Complications are rectal erosions , ischiorectal abscesses and anal fissures.

DISSEMINATED GONOCOCCAL INFECTION

Disseminated gonococcal infection has been estimated to occur in 0.5–3%[73] of patients as a result of hematogenous spread. It most commonly follows asymptomatic mucosal infections and is more common in women, with a female-to-male ratio of 3:1[74].

The classical presentation is dermatitis–arthritis syndrome in a patient with mild fever. Symptoms of disseminated gonococcal infection range from slight joint pain, few skin lesions, and no fever to overt polyarthritis and high fever. Patients with disseminated gonorrhea usually have no urogenital symptoms.

The clinical manifestations of DGI include vasculitis like skin lesions, arthritis, endocarditis (occurring in 1%–2% of cases), myocarditis, pericarditis, meningitis or other localized infections. The arthritis may be septic , mono articular or pauci articular, but arthralgia involves several joints. The most commonly infected joints are wrists, ankles, and joints of the hands and feet. They are swollen and tender.

An aspirate from the joint shows intracellular gram-negative diplococci and more than 40,000 leukocytes/ mm3. Arthritis is more commonly associated with positive synovial fluid cultures and negative blood cultures.

Skin lesions are few and limited to the extremities. These lesions start as papules and progress to pustules, bullae, petechiae, and necrotic lesions .The skin lesions are small, tender and initially maculopapular . A central vesicle or pustule appears and haemorrhage and necrosis commonly ensue. Lesions occur in crops, usually between five and 40, and are most commonly seen peripherally near the affected joints. They may also occur on the torso and palms and soles.

Associated features are joint pain, tenosynovitis , suppurative arthritis . Most of the DGI cases are caused by strains of AHU^- auxotype [75,76]. Complications of DGI include myocarditis, endocarditis, pericarditis, meningitis, anterior uveitis, hepatitis, and perihepatitis. Death occurs as a result of aortic valve incompetence and congestive cardiac failure [77].

Factors predisposing to disseminated gonococcal infection are as follows

1. Female
2. Men who have sex with men
3. Pregnancy
4. Menstruation
5. Systemic lupus erythematosus
6. Complement deficiency[78]
7. Intravenous drug use
8. HIV infection
9. Pharyngeal gonorrhea[79]

Patients with positive cultures from blood, joint fluid, skin lesions, or otherwise sterile sources constitute less than 50% of DGI cases and are considered to have proven DGI [80-83]. In more than 80% of DGI patients, N. gonorrhoeae may be cultured from the primary mucosal site(s) of infection (anogenital or pharyngeal cultures) or from a sexual partner in the absence of positive blood or other sterile-site cultures, these patients are usually referred to as having probable DGI.

Patients with an appropriate clinical syndrome and the expected response to therapy but with negative cultures for N. gonorrhoeae are referred to as having possible DGI. Over 90% of patients are subjectively improved within 48 hours of initiating therapy.

GONOCOCCAL INFECTIONS IN NEWBORN

Ophthalmia neonatarum

Transmission to the neonate during birth can result in gonococcal ophthalmia neonatorum. It is a conjunctivitis with a purulent discharge and usually appears in a neonate within 48 hours of birth (ophthalmia neonatorum can also be caused by other organisms including Chlamydia trachomatis). Keratitis with conjunctival scarring can result.

Disease presents as mucopurulent or purulent discharge that pours out when the eyelids are separated. Conjunctiva becomes inflamed bright red and swollen with marked chemosis. Complications are membranous conjunctivitis, corneal ulcer, corneal perforation, iris prolapse, anterior synechiae, leukoma, anterior staphyloma, anterior capsular cataract and panophthalmitis. 3% of untreated neonates may develop blindness and 20% may develop some degree of corneal damage[52].

Other manifestations in infants are disseminated gonococcal infections, usually seen as septic arthritis or arthritis and meningitis. Localized gonococcal abscesses of the scalp can occur in neonates through scalp electrodes used for fetal monitoring.

SPECIMEN CHOICE AND COLLECTION IN GONOCOCCAL INFECTIONS

Specimens should be collected with Dacron or rayon swabs because calcium alginate may be toxic to gonococci. Fatty acids inhibit the growth

of gonococci, therefore cotton swabs should not be used[84]. To minimize the inhibitory effects of unknown substances in the specimen, swabs should be inoculated directly into growth medium or placed in transport medium immediately after sampling

Urethral specimen

Urethral discharge from the meatus is preferred for the detection of N gonorrhoeae. If there is no urethral discharge at the meatus , an intraurethral swab can be used for the detection of gonococci. If there is no discharge, compress the meatus vertically to open the distal urethra and insert a thin, water-moistened swab (Dacron) with flexible wire slowly (3 cm to 4 cm in males or 1 cm to 2 cm in females), rotate slowly and withdraw gently.To increase the chance of detecting the organisms, samples should be collected from patients who have not voided for at least 2 hours.

Urine specimen

Urine is one of the specimen types suitable for nucleic acid tests for diagnosing N gonorrhoeae infections in males and females. Ask the patient to collect only the first 10 mL to 15 mL of urine.Patients should not have voided for at least 2 h before specimen collection, to increase the chance of detecting the organism.

Cervical specimen

Insert a speculum into the vagina to view the cervix. Insert a swab 1 cm to 3 cm into the endocervical canal and rotate for 10 s to 30 s to allow the absorption of exudates. When the patient presents with a urethral discharge, additional urethral or meatal specimens should be taken because the sensitivity of detecting gonococci from cervical specimens is lower than that from urethral or meatal specimens.

In cases of suspected coinfections of N gonorrhoeae and Chlamydia trachomatis, the cervical specimen for N gonorrhoeae detection should be taken before the specimen for C trachomatis, because N gonorrhoeae is present in the mucus from the endocervix and C trachomatis is present in the cervical epithelial cells.

Oropharyngeal specimens

Oropharyngeal and rectal specimens should be processed only for culture because the performance of nonculture methods is not well established for these specimen types. Rub sterile swabs over the posterior pharynx and tonsillar crypts and inoculate directly into the culture medium.

Rectal specimen

Insert a swab 2 cm to 3 cm into the anal canal. Avoiding fecal material, rotate just inside the anal ring and allow the swab to absorb specimen for 10 seconds.

Conjunctiva

The purulent discharge in gonococcal ophthalmia neonatorum and conjunctivitis in adults should be used for diagnosis. Any exudate or pus present in the eye should be carefully removed with a sterile swab.

Body fluids

When patients have symptoms of systemic or disseminated infections, blood and fluid from arthritic joints are suitable samples for culturing. Perform percutaneous aspiration for pleural, pericardial, peritoneal or synovial fluids. Use nonheparinized collection if possible.

DIAGNOSIS OF GONORRHEA

1. Gram staining

Smear for gram staining may be performed as soon as the specimen is collected from the urethra, cervix, vagina or rectum. The swab should be rolled gently onto the slide to preserve cellular morphology and over an area not less than 1 cm^2.

Gram staining is useful for detecting *N. gonorrhoeae*, especially from symptomatic male urethral smears (sensitivity ~90–95%), but less sensitive for asymptomatic males and females (sensitivity ~50–70%)[85]. Gram staining reveals characteristic intracellular gram negative diplococci within polymorphonuclear leucocytes.

More than 95% sensitivity in urethral specimens. 30-50% sensitivity in endocervical specimens. Sensitivity is lower in pharyngeal and rectal specimens. Negative gram staining does not rule out the diagnosis of gonorrhea. Some serovars of N. gonorrhoeae have been noted to have reduced or negative Gram stain microscopy results[86]. The presence of extracellular Gram-negative diplococci is an equivocal finding which must be confirmed by culture[87] or nucleic acid amplification test.

2. Culture

Culture is the “gold standard” in the diagnosis of gonococcal urethritis.It remains as a useful tool to determine the antibiotic sensitivity. N. gonorrhoeae is a fastidious organism, requiring enriched media for growth.

Gonococci forms small, round, translucent, soft, emulsifiable, and convex colonies with a fine granular surface.

The sensitivity of culture is 80%–95% and is affected by factors including the specimen collection technique, condition of medium prior to use, and handling issues (e.g. timing of plate inoculation, transit time, and storage of plates[88].

The primary specimens should be inoculated into nonselective chocolate agar or selective agar containing antimicrobial agents that inhibit the growth of commensal bacteria and fungi.

Other culture media used are modified Thayer-Martin, Martin Lewis and New York City medium .The anti bacterial agents used are vancomycin, colistin, trimethoprim and the antifungal agents nystatin and amphotericin B. Some fastidious strains, such as the arginine-, hypoxanthine- and uracil-requiring strains, are more susceptible to the concentrations of vancomycin or trimetho prim used in the selective media.

For identification by culture, if possible specimens should be directly inoculated on culture plate and incubated in atmosphere containing 5%CO_2 at 37^o C. If direct innoculation is not possible transport medium like Stuart or Amies medium can be used.

Reading can be done after 24 hours of incubation, small pinpoint grey to white smooth translucent raised convex colonies are seen. Presumptive identification of N.gonorrhoeae are by

- Gram staining of smear from suspected colony shows typical gram negative diplococci.

- Oxidase test will be positive.

  To perform the test, a drop of reagent (tetramethyl p-phenylenediamine or dimethyl p-phenylenediamine) is applied to filter paper or the tip of a cotton swab. Culture is then applied to the filter paper or cotton swab tip using a platinum or plastic loop. A dark-purple colour change within 10 seconds indicates a positive sample.

- Catalase test will be positive.

  The catalase reagent is superoxol (30% hydrogen peroxide) used in the presumptive identification of N .gonorrhoeae. A drop of the reagent is placed in the centre of a clean glass slide and the suspect colony is picked with a loop and emulsified in the reagent. N gonorrhoeae will produce a positive reaction with bubbling within 1 s to 2 seconds.

- Rapid Carbohydrate utilization test

  Carbohydrate fermentation test is also useful in biochemical identification. N. gonorrhoeae ferments glucose, but not lactose, maltose and sucrose.

- Fluorescent antibody test:

  The fluorescein isothiocyanate- labelled monoclonal antibody is used. When viewed under a fluorescence microscope, cultures positive for N.

gonorrhoeae show apple-green fluorescent staining of the kidney-shaped diplococci.

- Coagglutination tests:

  Coagglutination tests can be performed on primary culture.

3. Nucleic Acid Amplification Tests

Molecular detection methods allow for a more rapid and specific diagnosis of pathogens that are fastidious or cannot be cultured.These methods permit the use of specimens that are unsuitable for culture, such as urine and vaginal swabs that can be obtained from patients without discomfort[89-91].

Single detection systems or dual detection tests for C.trachomatis and N. gonorrhoeae are now commercially available. In addition, each of these multiplex assays has used a unique N. gonorrhoeae gene target and amplification technology[92]. There are several advantages of N. gonorrhoeae NAATs.

1. First, they offer better sensitivity than bacterial culture. Gonococcal culture sensitivity ranges from 85% to 95% for acute infections and as low as 50% for females with chronic infection. This makes NAAT particularly suitable for screening.

2. Second, specimens collected for NAAT assays do not require the organism to be viable. The sensitivity of culture is adversely affected if there is a delay in the transport of the specimen.

3. Third, NAATs can be performed on specimens collected by non-invasive methods such as first void urine[92] .

However high cost and quality control makes it difficult to use NAATs widely in resource-poor countries like India. Another limitation is the inability of NAAT to provide information on antibiotic susceptibility.

N. gonorrhoeae NAATs may be subject to cross-reaction with commensal Neisseria strains.

4. Serologic tests

Serologic tests have been developed to detect antibodies to N. gonorrhoeae or its components using complement fixation, immunoprecipitation, bacterial lysis, immunofluorescence, hemagglutination, latex agglutination, enzyme-linked immunoabsorbance, and other techniques[93].

5. Amplification methods

Amplification methods like PCR, Ligase chain reaction, Strand displacement amplification system, Nucleic acid sequence-based amplification (NASBA) are used in detecting Gonococci.

6. Antimicrobial Susceptibility Testing

When cultures are available, susceptibility testing should be performed on N . gonorrhoeae . All of these antibiotics used for the

treatment of gonococcus should be included in a susceptibility testing panel. The agar dilution method described in the National Committee for Clinical Laboratory Standards (NCCLS) guideline is used to determine the susceptibilities of N gonorrhoeae for the national antimicrobial surveillance program.

TREATMENT OF GONOCOCCAL INFECTIONS

Since 1985, the treatment recommendations published by the CDC for the United States have recommended single-dose therapy with medications effective for eradication of N. gonorrhoeae, followed by therapy expected to eradicate C. trachomatis infections (currently either azithromycin or doxycycline). This approach has been shown to be effective for the therapy of both the infections[94,95].

For treatment of MSM with gonorrhea, the ceftriaxone regimen is preferred over other regimens. The strains of gonococci that occur in homosexual men are more likely to harbor the antibiotic resistance mutation (mtr),[96] which makes these organisms somewhat more resistant to antibiotics and thus results in higher treatment failure rates when alternate regimens are used[97].

CDC TREATMENT GUIDELINES [98]

Uncomplicated Gonococcal Infections of the Cervix, Urethra and Rectum

✓ Recommended Regimen

Inj . Ceftriaxone 250 mg IM single dose

✓ Alternative Regimen

Tab.Cefixime 400 mg orally single dose

Uncomplicated Gonococcal Infections of the Pharynx

Inj. Ceftriaxone 250 mg IM single dose

Pregnant women

Inj . Ceftriaxone 250 mg IM single dose

HIV patients

Same treatment regimen as those who are HIV negative

Dual Therapy for Gonococcal Infections

As gonococci is developing antimicrobial resistance rapidly, a theoretical basis exists for combination therapy using two antimicrobials with different mechanisms of action (e.g., a cephalosporin plus azithromycin) to improve treatment efficacy and potentially slow the emergence and spread of resistance to cephalosporins.

Use of azithromycin as the second antimicrobial is preferred to doxycycline because of the convenience and compliance advantages of single-dose therapy and the substantially higher prevalence of gonococcal resistance to tetracycline than to azithromycin among GISP isolates, particularly in strains with elevated cefixime MICs . In addition, clinical trials have demonstrated the efficacy of azithromycin 1 g for the treatment of uncomplicated urogenital Gonococci .

Limited data suggest that **dual treatment with azithromycin** might enhance treatment efficacy for pharyngeal infection when using oral cephalosporins. In addition, persons infected with N. gonorrhoeae frequently are coinfected with C. trachomatis, this finding has led to the longstanding recommendation that persons treated for gonococcal infection can also be treated with a regimen that is effective against uncomplicated genital C.trachomatis infection, further supporting the use of dual therapy .

Disseminated Gonococcal Infection

- Treatment of Arthritis and Arthritis-Dermatitis Syndrome

Recommended Regimen is Inj. Ceftriaxone 1 g IM or IV every 24 hours for 7 days.

- Treatment of Gonococcal Meningitis and Endocarditis

Recommended Regimen is Inj.Ceftriaxone 1–2 g IV every 12–24 hours

Therapy for meningitis should be continued with recommended parenteral therapy for 10–14 days. Parenteral antimicrobial therapy for endocarditis should be administered for at least 4 weeks.

Ophthalmia Neonatorum

Inj.Ceftriaxone 25–50 mg/kg IV or IM in a single dose, not to exceed 125 mg

To minimize disease transmission, persons treated for gonorrhea should be instructed to abstain from sexual activity for 7 days after treatment and until all sex partners are adequately treated (7 days after receiving treatment and resolution of symptoms, if present). All persons who receive a diagnosis of gonorrhea should be tested for other STDs, including chlamydia, syphilis, and HIV.

MANAGEMENT OF SEXUAL PARTNERS

Treatment of all recent sex partners of patients with gonorrhea, prior to the availability of culture results, in order to prevent complications and to prevent the transmission ("epidemiologic treatment")[99] should be done.

FOLLOW-UP

Because all recommended regimens have cure rates that approach 100%, repeat cultures for test of cure are no longer recommended for all patients with gonorrhea[100].However, test-of-cure often is warranted if an atypical regimen is used or if medication compliance is uncertain. As a result, rescreening for acquisition of gonorrhea or other STDs is now recommended for persons with gonorrhea approximately three months following their initial diagnosis.

PREVENTION

Properly used condoms provide a high degree of protection against acquisition and transmission of genital infection[101,102]. The diaphragm and cervical cap also may reduce transmission and acquisition of endocervical infection[103-105].

GONOCOCCAL RESISTANCE

Prior to mid-1930s, when sulfonamide was introduced, gonorrhea therapy involved local genital irrigation with antiseptic solutions such as silver nitrate or potassium permangate[106,107]. By 1944, however, many gonococci had become sulfonamide resistant, and infection persisted in about one-third of patients treated with maximal doses. Fortunately, in 1943 the first reports of the near 100% utility of penicillin for gonorrhea therapy were published[108].

The very high rate of antimicrobial resistance among N. gonorrhoeae isolates are due to

- The overuse and misuse of antimicrobials due to over-the-counter availability
- Self medication
- Prescription by unqualified practitioners.

Penicillin

Penicillin was introduced in 1943 led to abandonment of sulphonamides. Single low dose treatment with penicillin became the standard regimen. Isolates obtained in the 1940s typically were inhibited by 0.01 μg/mL

penicillin G or less. Resistance to penicillin occurred over the subsequent several decades, this was shown due to accumulation of several independent chromosomal mutations that affect cell surface structure.

Three genetic loci resulted in low-level resistance to penicillin[107]. One of them (penA) results in alteration of penicillin-binding protein two (PBP2), decreasing the affinity of PBP2 for penicillin.The other loci (mtr and penB) result in low-level resistance to many antibiotics in addition to penicillins.

The mtrR locus has been shown to encode a repressor of an mtrCDE efflux-pump that, when fully expressed, reduces intracellular concentrations of antibiotics[110-112].The penB locus involves point mutations of porB, the structural gene for the major porin protein, altering net entry of antibiotics through the porin channel.

Introduction of penA, mtr, and penB into a sensitive gonococcal strain results in an increase in the minimum inhibitory concentration (MIC) of penicillin G from 0.01 to about 1.0 μg/mL. This fourth-step mutation was recently shown to be due to a point mutation in the secretin protein PilQ.

In 1976, a new type of gonococcal resistance to penicillin was documented. The production of β-lactamase owing to the presence of plasmids that encode the production of TEM-1 type of β-lactamase[113].

Tetracycline

Chromosomal loci mediating low-level resistance to tetracycline have been designated mtr, penB, and tet. Both chromosomal and plasmid mediated resistance are found in gonococcal infection, latter being responsible for high level of resistance. Chromosomal resistance have been linked to mtr and penB gene alterations. In 1986 resistance due to tetM determinant was noted[114].

Spectinomycin

This injectable agent retains its activity against Gonococci in most parts of the world. Resistance to N.gonorrhoeae to spectinomycin usually occurs via single step chromosomal mutation. There are only few reports of spectinomycin resistance due to its limited use.

Quinolones

As Gonococci are extremely susceptible to quinolones , these drugs were recommended for the treatment of drug resistant Gonococci. Ciprofloxacin and ofloxacin are the primary treatment regime in number of countries. Resistance is exclusively chromosomally mediated. Resistance is mediated by gyrA gene encoding DNA gyrase and parC gene encoding topoisomerase 4.

Macrolides

Erythromycin are used in treatment of gonorrhea. Increased use of azithromycin in treating other diseases may increase the selective pressure for macrolide resistant gonococcus. Resistance is mediated through efflux pump. They are Mtr C-Mtr D- Mtr E system. Recent one is Mtr- F.

GONOCOCCAL ISOLATE SURVEILLANCE PROJECT (GISP)

GISP is a national sentinel surveillance system designed to monitor trends in antimicrobial susceptibilities of Neisseria gonorrhoeae strains in the United States[79].GISP has demonstrated that gonococcal isolates from MSM are more likely to exhibit antimicrobial resistance than isolates from Heterosexuals [80,81].During 2007–2016, the proportion of isolates with elevated ceftriaxone minimum inhibitory concentrations (MICs) (≥0.125 μg/ ml) was higher in isolates from MSM than heterosexuals[82].

Quinolone resistant gonococci have been increasingly isolated from MSM, necessitating the use of expanded spectrum cephalosporins for the treatment of gonococcal infections in MSM.

VACCINES FOR GONORRHEA

The development of a vaccine against gonorrhea has encountered many difficulties due to limited understanding of protective immunity and lack of animal models[115].Gonorrhea has numerous serotypes and no naturally occurring protective antibodies have been found. One immune evasion strategy is

induction of antibodies against reduction modifiable protein Rmp that blocks the function of bactericidal antiporin antibodies.

Gonorrhea is only infectious in humans making human trials necessary in all stages of development. Pili surface proteins can rapidly change to different antigenic forms making vaccine targets almost impossible to identify[116]. Currently research is focused on transferrin binding , pilin and porin proteins[117-119].

MEN WHO HAVE SEX WITH MEN

MSM is a nomenclature coined in the mid 1980s in an attempt to find an umbrella term to describe a variety of men who have sex with other men, and thereby may transmit or acquire HIV or other STDs.

Male homosexual behavior has been documented in the Old Testament and written by classical Greek poets. Many famous personalities in the history like Alexander the Great, Tchaikovsky, Walt Whitman were known to prefer homosexual partners[120].

According to NACO as estimated by an expert group in 2006, there are approximately 830,000-1,250,000 female sex workers, 2,350,000 MSMs, 235,000 male sex workers, 96,000-189,000 male intravenous drug users, and 10,000 to 33,000 female intravenous drug users in India. Among them making MSM the largest group[121].

India is the country, where the higher number of HIV-infected people in the world are seen. Since the first AIDS case reported in 1986, more than 3,50,000 Indians have died of AIDS. Very Little is known about the role of men who have sex with men (MSM) in the Indian AIDS epidemic. Many efforts on MSM have been hindered by the complexity and sensitive nature of sexual identity and behaviors in India.

In India, MSM are a diverse group of individuals who may not necessarily be associated with an overriding homosexual identity. Social norms

proscribing premarital and extramarital heterosexual sex are strictly enforced in a manner that readily encourages men to have sex with men, because women are not easily accessible to men outside of marriage, men may release their sexual tensions with other men. At the same time, men who seek sex with men are frequently married and engage in marital sex as a social duty in response to strong social norms and intense familial and community pressure for procreation.

NACO estimates that India is home to 2.5 million MSMs of which 1,00,000 are at high risk of contracting HIV due to persons with multiple partners and commercial sex. Already, 15% of this community is infected with HIV. In most of the cases, it is the bisexual behaviour, which is commoner than isolated homosexual behavior [122].This bisexual behavior makes MSM a bridge population for the spread of sexually transmitted diseases (STDs) and HIV.

It is important to understand and distinguish between the concepts of sexual identity, orientation and behaviour. One's identity is how one identifies oneself, regardless of orientation , sexual desire and behaviour. For example, a married, self-identified heterosexual male, may still engage in sexual behaviour with other men. Such a person could be categorized as an MSM, even though he might not view or consider such intimacy to be considered as sex in his cultural milieu, and he might not be willing to be forthcoming about his desire to be with other men.

A classification was given by Humsafar trust, working for this community, where MSM are classified into 4 different categories based on identity, gender, behavior, and profession.

Men who have Sex with Men(MSM) have been classified as

1. Receptive male partners of oral and anal sex as “kothis” and they present typically with feminine characteristics
2. Insertive male partner in oral and anal sex as “Panthis”, who present as typically masculine characteristics
3. Both receptive and insertive partners as “double deckers”[123-125].
4. The other group associated with MSMs are “Hijras” or “Alis” who were referred as “transgenders”.

“Alis”, referred to as eunuchs in English, were born biologic males but cannot procreate as a result of castration and consider themselves a third gender neither male nor female and have sex exclusively with males. They are considered as sexual minority and have been a part of Indian society at least since the existence of the first Sanskrit texts [126,127] .

However, Hijras or transgenders are different from MSM. Hijras are born biologically as males and may or may not have undergone ritual castration. In India, some have also undergone hormonal therapy and a few, surgical interventions for sex change. These group are often stigmatized and they use sex for living. Transgenders considered as an important group in the transmission of sexually transmitted infections and HIV. Lastly, there are men who indulge in sex with men for cash, Male sex workers (MSWs) encompass all these four broad areas.

Two-thirds of the patients involved in bisexual relationships, serve as an important bridge population in transmitting infections between men and women.

Out of these One - third were married to a female counterpart , this is common in India as homosexuality is considered a social taboo and to have intercourse with a female counterpart or get married is a part of one's own ''social duty''[128].

Datas from different surveys across the country show that same sex activity is prevalent across India in both urban and rural areas. MSM are a part of all socioeconomic groups and all religious as well as social groups. One study done in villages reported that nearly 10% of single men and 3 % of married men are engaged in same sex behaviour[129] . Another survey showed that 7 % of male college students in Chennai had their first sexual experience with another male[130]. Another potential bias is the probable under reporting of same sex behaviour due to stigma surrounding such behaviours and relationships.

Although the majority of HIV transmission in India is heterosexual, a disproportionately large amount of transmission occurs among MSM [131]. MSMs in India have a higher prevalence of HIV than the general population (7.3 vs 0.36%, respectively) .[131]NACP, NACO has also found HIV prevalence among MSM to be 20 times greater than in the general population[121].

Vittinghoff[132] and colleagues estimated the per contact risk of unprotected oral exposure to the ejaculate of HIV-infected or status unknown partners to be 0.4/1000, which was comparable to their estimate of the risk from unprotected insertive anal sex.

Unprotected anal intercourse has been generally shown to be most efficient for sexual HIV transmission with an 8.2/1000[132] risk for unprotected

receptive anal intercourse with a known HIV infected partner, and 0.6/1000 risk for unprotected insertive anal sex with a known HIV infected partner.

The high rates of HIV and STIs in Indian MSM may be due to several reasons, including lack of education, lack of access to basic health care, marginalization, social stigma, psychological consequences may in turn, lead to increased risk-taking behaviours, commercial sex work, increased exposure to sexual violence and substance use [133-137].

The most common STDs among MSM recorded in one Indian study was syphilis (27%) followed closely by Condylomata accuminata(21%) and herpes genitalis (19%). Gonococcal infection (11%) was the fourth most common STD. Small proportions were constituted by chancroid, candidal balanoposthitis and genital scabies[138].

Factors That Potentiate the Transmission of STIs and HIV among MSM

- ✓ Lack of willingness to change one's sexual behavior
- ✓ Emotional distress
- ✓ Ongoing substance use
- ✓ Past sexual abuse (childhood sexual abuse)
- ✓ Sex with familiar partners
- ✓ Diminished sense of sexual control
- ✓ Sexual compulsivity

MSM AND GONORRHEA

In heterosexuals, the primary sites of gonorrhea infections are the urethra in men and cervix in women. Most of the heterosexual men with urethral infection become symptomatic and quickly seek healthcare within a few

days. About half of women are asymptomatic, and thus they take longer time to seek healthcare than men.

Gonorrhea rates have been increased in recent years among urban MSM in developed countries, paralleling the rise seen with syphilis[139,89]. In MSM, 3 sites are commonly infected

1. Pharynx
2. Rectum
3. Urethra [90]

In a Seattle clinic, the percentage of MSM with pharyngeal gonorrhea was 6.5%, rectal gonorrhea 9.7%, and urethral gonorrhea 5.5% [91].Almost all urethral infections were symptomatic (96%), but most pharyngeal and rectal infections were asymptomatic.

Most pharyngeal or rectal infections (58%) were not associated with urethral infection [91]. An additional factor favoring the persistence of gonorrhea infected sites in MSM is their lower rate of partner notification compared with heterosexuals[140].

Asymptomatic nature of infection in MSM creates a scenario in which men with pharyngeal or rectal gonorrhea often go untreated, and they continue to transmit the infection to the urethra of a sex partner. The longer duration of infection translates into a higher reproductive rate for gonorrhea in MSM compared with heterosexuals, independent of the number of sexual partners.

Most recent sexual acts among MSM show that most have practiced oral sex , oro-anal sex and penile-anal sex . In contrast, in heterosexuals, penile-vaginal sex occurs in 95% of most recent sexual acts, therefore, most sexual acts between heterosexuals in which gonorrhea transmission occurs will lead to symptomatic infections that prompt them to seek treatment .

Between 1999 and 2005, the overall number of gonorrhea test performed from all anatomical sites for MSM increased at GISP clinics, with the majority being done because of symptomatic complaints.The median clinic test positivity rate was 11% for urethral gonorrhea, 8% for rectal gonorrhea, and 7% for pharyngeal gonorrhea[141,142].

In one Indian study conducted at Hyderabad ,for a period of 1 year, 183 MSM were tested for pharyngeal and rectal gonorrhea and positive percentages were 1.09% and 11% respectively. Pharyngeal coinfections with Gonococci and Chlamydia trachomatis have been reported in the MSM population and can account as an important reservoir that if not diagnosed and not treated, could contribute to the HIV and STI epidemics[143].

According to CDC prevalence of pharyngeal gonorrhea and pharyngeal chlamydia has been demonstrated to be 7.3% and 2.3%, respectively[144].

MSM AND PHARYNGEAL GONORRHEA

Oral sex involves giving or receiving oral stimulation to the penis (fellatio), the vagina (cunnilingus), and the anus (anilingus). Many men who engage in oral sex believe that they were practicing safe sex and were surprised when they received a venereal disease diagnosis. Because the risk of HIV transmission through oral sex is much lower than during anal or vaginal sex, persons might wrongly consider that unprotected oral sex is safe.

Although the majority of women and heterosexual men report oral sex, most clinics do not routinely offer screening of the oropharynx. Current screening guidelines recommend screening for pharyngeal gonorrhea among MSM who report receptive oral sex. Transmission of gonorrhea to the pharynx is thought to be more efficient through oral-penile contact. There is increasing evidence of pharynx to genital transmission of gonorrhea and it is the important reservoir and source of urethral gonorrhea. As many men are bisexuals, oral sex may be contributing to the ongoing transmission of gonorrhea between men and their female sex partners.

Moreover, gonococcal infections in the pharynx are more difficult to eradicate than infections at urogenital sites. Consequently, gonorrhea infections of the pharynx require a different treatment strategy further stressing the importance of the pharynx as a reservoir for continual transmission of gonorrhea and a potential source of drug resistant strains of gonorrhea.

The factors independently associated with pharyngeal gonorrhea include the number of oral sex partners, the level of oral exposure to seminal fluids, and a concomitant urogenital infection with gonorrhea.

Prevention of pharyngeal Gonorrhea

CDC recommends[141] the following screening tests should be performed at least annually for sexually active MSM, including those with HIV infection.

1. HIV serology, if HIV status is unknown or negative and the patient himself or his sex partner(s) had more than one sex partner since recent HIV test.
2. Syphilis serology to establish whether persons with reactive tests have untreated syphilis, have partially treated syphilis, are manifesting a slow serologic response to appropriate prior therapy or serofast.
3. A test for urethral infection with N. gonorrhoeae and C. trachomatis in men who had insertive intercourse during the preceding year (testing of the urine using NAAT is the preferred approach).
4. A test for rectal infection with N. gonorrhoeae and C. trachomatis in men who have had receptive anal intercourse during the preceding year (NAAT of a rectal specimen is the preferred approach).
5. A test for pharyngeal infection with N. gonorrhoeae in men who have had receptive oral intercourse during the preceding year.

Quinolone-resistant gonococci have been increasingly isolated from MSM, constituting 29% of specimens from MSM in CDC's GISP in 2005 and

necessitating the use of expanded spectrum cephalosporins for the treatment of gonococcal infections in MSM[145,146].

MSM are socially shy in accepting their sexual behavior. Their identification is important as most of them are bisexuals and promiscuous, thereby playing a role in spread of STDs in vast number of partners. The profile of STDs may also differ in MSM clinically, which makes it all to identify them. Proctoscopy , rectal, and pharyngeal swabs or other investigations were not done to detect various STDs in asymptomatic patients, in MSMs apart from screening done for HIV and syphilis. Therefore, it is very essential to do a rectal and pharyngeal swab in all MSMs as these sites harbor silent infection.

More frequent screening (3-6months interval) may be indicated for MSM at greater risk, those with multiple or anonymous partners, those who have sex in conjunction with illicit drug use, who use methamphetamines, or those whose partners participate in these activities. Adherence to these screening recommendations is an important strategy for gonorrhea control in sexually active MSM, because asymptomatic infection at pharyngeal and rectal sites is common among this population, and gonococcal transmission is efficient with insertive or receptive rectal intercourse and fellatio.

AIM AND OBJECTIVES

To study the Prevalence of asymptomatic pharyngeal gonorrhea among Men who have sex with Men attending STD op at Government Rajaji hospital, Madurai from September 2017 to September 2018

MATERIALS AND METHODS

1. Method of Study:

Men having sex with Men attending STD op at Government Rajaji hospital , Madurai who give consent for the study will be selected. Detailed clinical history including presenting complaints, Past history and Sexual history are taken.All participants will undergo complete physical and genital examination.

All patients fulfilling the inclusion criteria and who give consent for the study are screened for pharyngeal gonorrhea.

Under strict aseptic precautions, after pressing the tongue with tongue depressor swab is rolled over the tonsils and pharyngeal wall with enough pressure to dislodge the cells from mucosal surface.

Specimen taken are undergone gram stain examination for gonococci and culture for gonococci in chocolate agar. Those pharyngeal samples which were culture positive for gonococci were subjected to Gram Stain , Carbohydrate Utilisation Test , Oxidase Test and Catalase test. All participants will be screened for syphilis and HIV as a routine.

2. Materials and methods:

A) Study area:

The study will be carried out in department of STD, Government Rajaji hospital, Madurai medical college, Madurai.

B) Study period:

1 year from September 2017 to September 2018

C) Study population:

50 asymptomatic Men having sex with Men who attend STD OP at Government Rajaji hospital , Madurai during the study period.

D) Inclusion criteria:

1. Men having sex with Men attending STD OP at Government Rajaji hospital , Madurai during the study period.

2.Patients who give consent for the study.

3. Age group 19 to 59 years

4. HIV negative patients

5. Sexually active Men having sex with Men indulging in oral intercourse in past 3 months.

6.Patients not on medications (antibiotic) in past 3 months.

E) Exclusion criteria:

1.Patients who do not give consent for study.

2.<19 years and >59 years

3.HIV positive patients

4.Patients with History of pharyngitis

5.Patient who have taken any drug (antibiotic) in past 3 months.

6. Men having sex with Men who donot indulge in oral intercourse in past 3 months.

F) Study design:

Hospital based case control study

G) Data collection:

A pre designed proforma will be used to collect the clinical details of the patients.

H) Analysis:

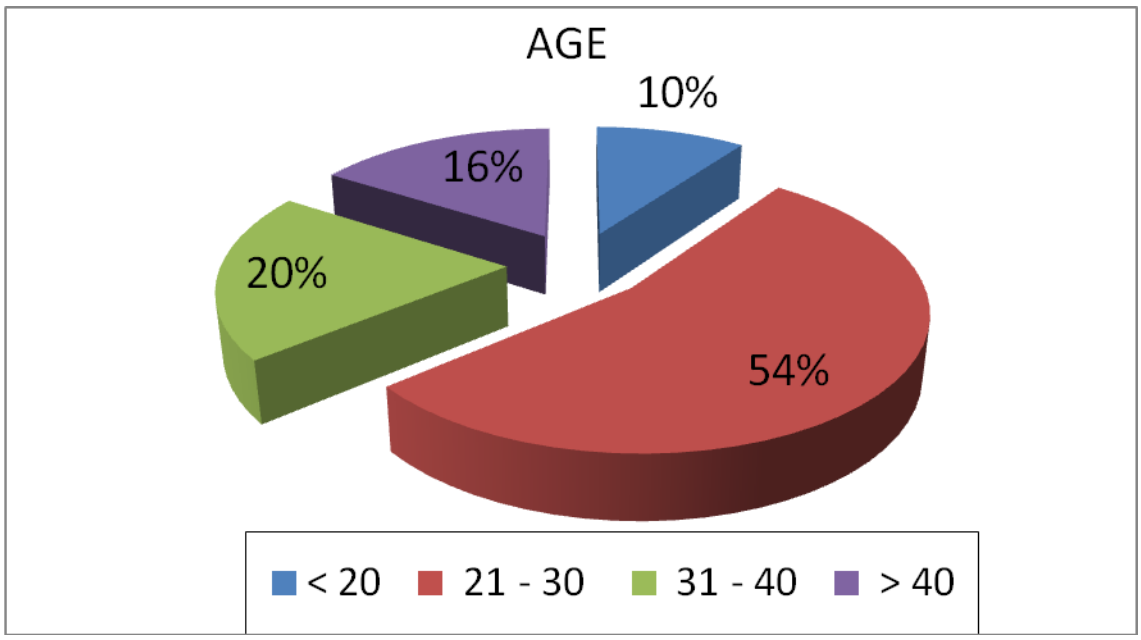
Statistical analysis

Observations and results

Age distribution

Out of 50 study participants of MSM with ororeceptive contact enrolled in our study, most commonly seen age group is 21-30 years (54%) , followed by age group of 31-40 years (20%) , greater than 40 years (16%) and less than 20 years(10%).

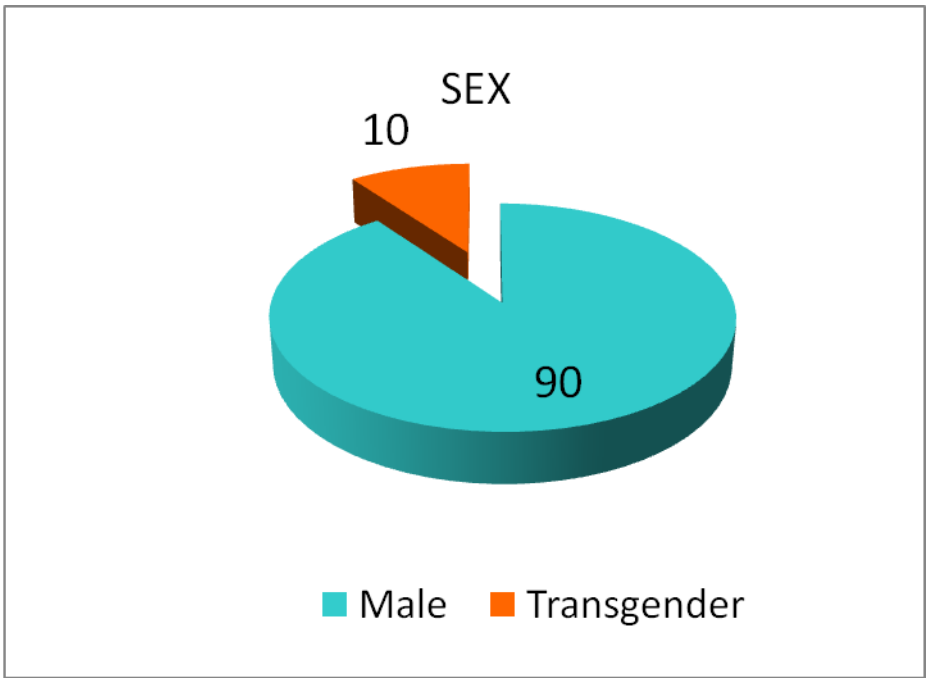
Age in years	%
< 20	10
21 - 30	54
31 - 40	20
> 40	16
Total	100



Sex distribution

Out of 50 cases enrolled in our study, 90% were males and remaining 10% were transgenders , not undergone castration.

Sex	%
Male	90
Transgender	10
Total	100

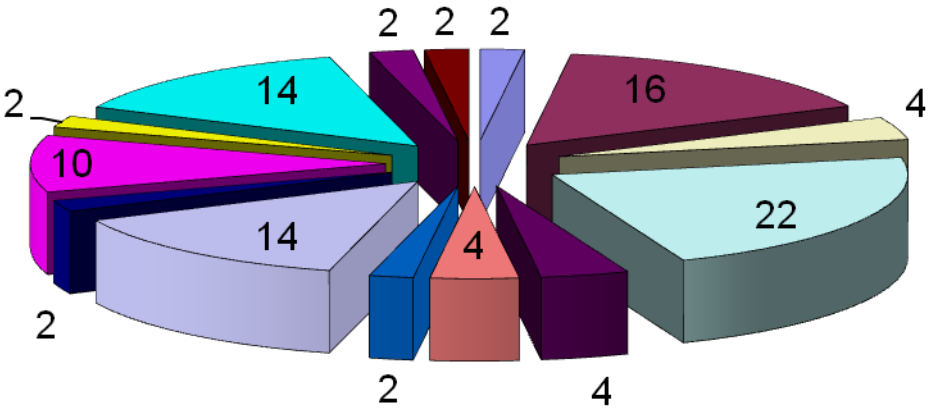


Occupation

Out of 50 cases enrolled in our study 22% were coolie, followed by that 16% were doing business, 14% were office workers and another 14% were students and 10% were involved in prostitution.

Occupation	No.of cases	%
Artist	1	2
Business	8	16
Cook	2	4
Coolie	11	22
Farmer	2	4
Foreign	2	4
Not working	1	2
Office worker	7	14
Plumber	1	2
Prostitution	5	10
Sales executive	1	2
Student	7	14
Tailor	1	2
Others	1	2
Total	50	100

OCCUPATION

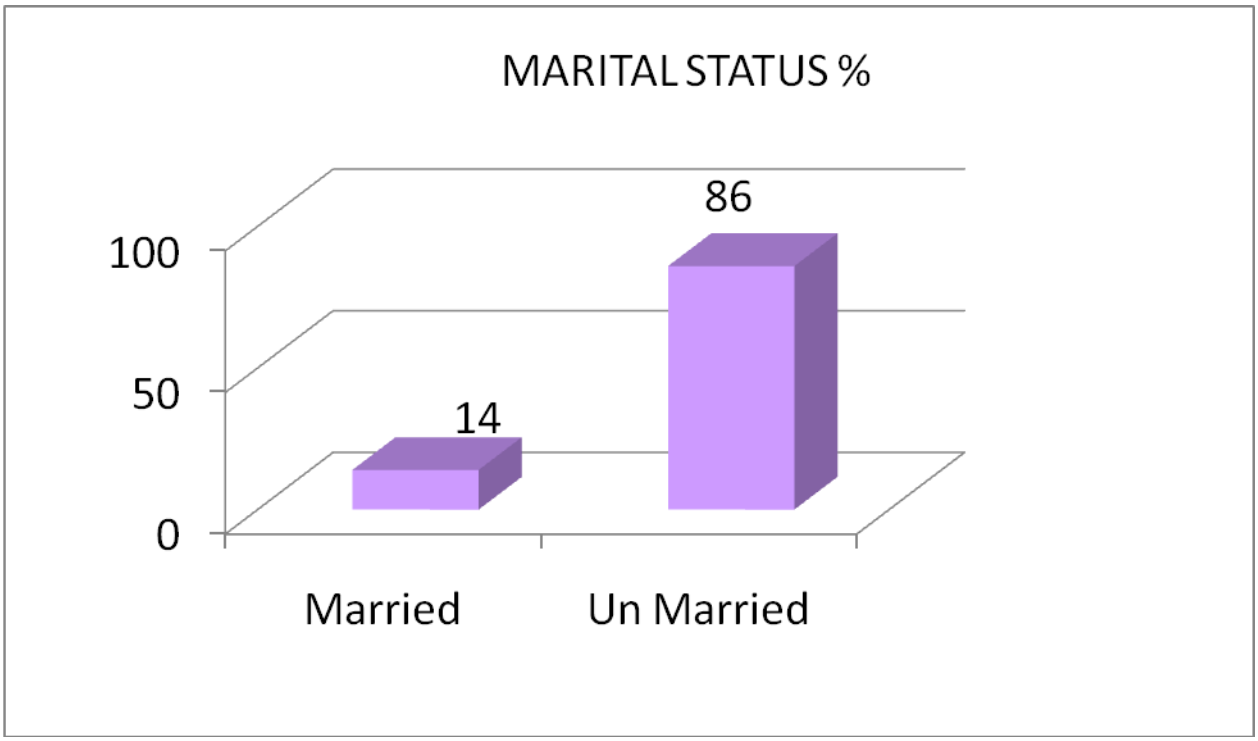


Out of the above said occupation , the most important group are students (14%) and prostitution (10%) which is considered to be significant, as they actively transmit STIs.

Marital status

Out of 50 cases enrolled in our study 14% were married and 86% were unmarried .

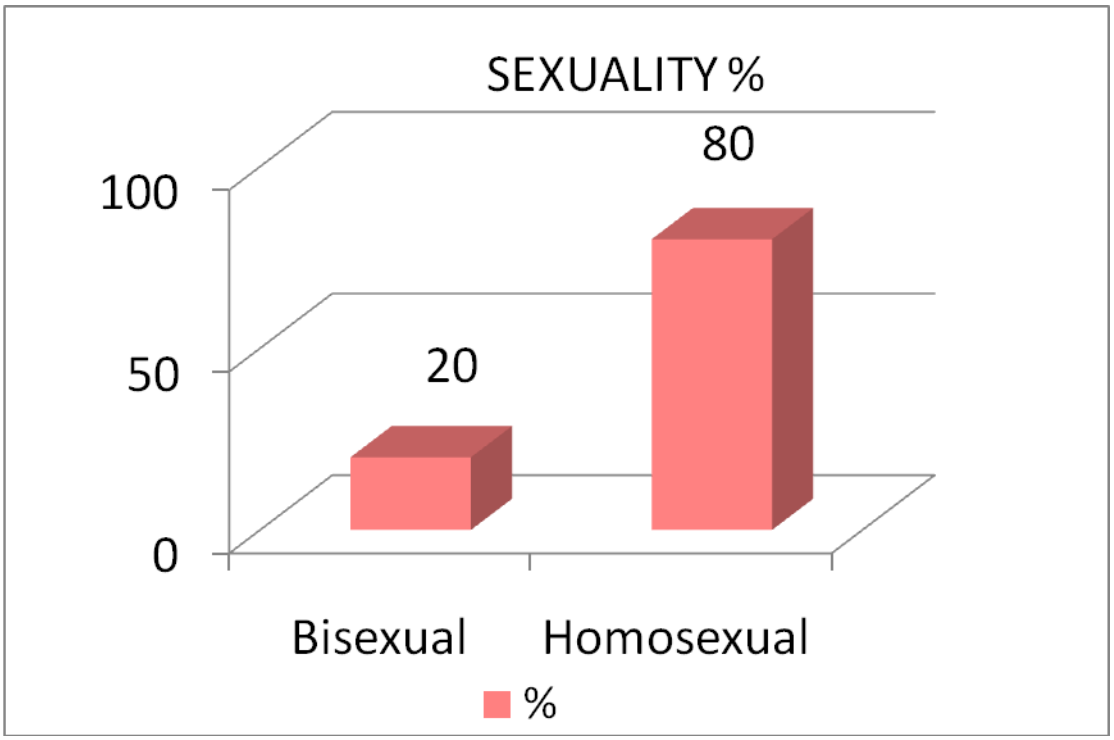
Marital status	%
Married	14
Un Married	86
Total	100



Sexuality

Out of 50 cases enrolled in our study, 80% were homosexuals and 20% were bisexuals.

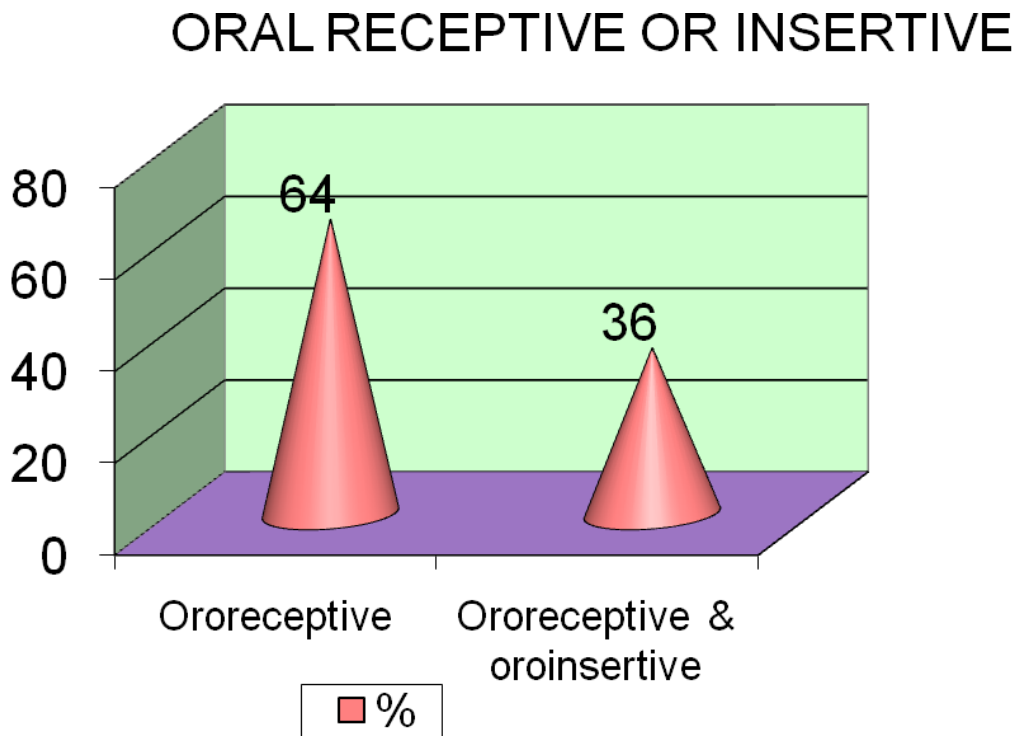
Sexuality	%
Bisexual	20
Homosexual	80
Total	100



Oro receptive / insertive contact

Out of 50 cases enrolled our study , 32 cases (64 %) had only ororeceptive contact and 18 cases (36%) had both oro receptive and oro insertive contact.

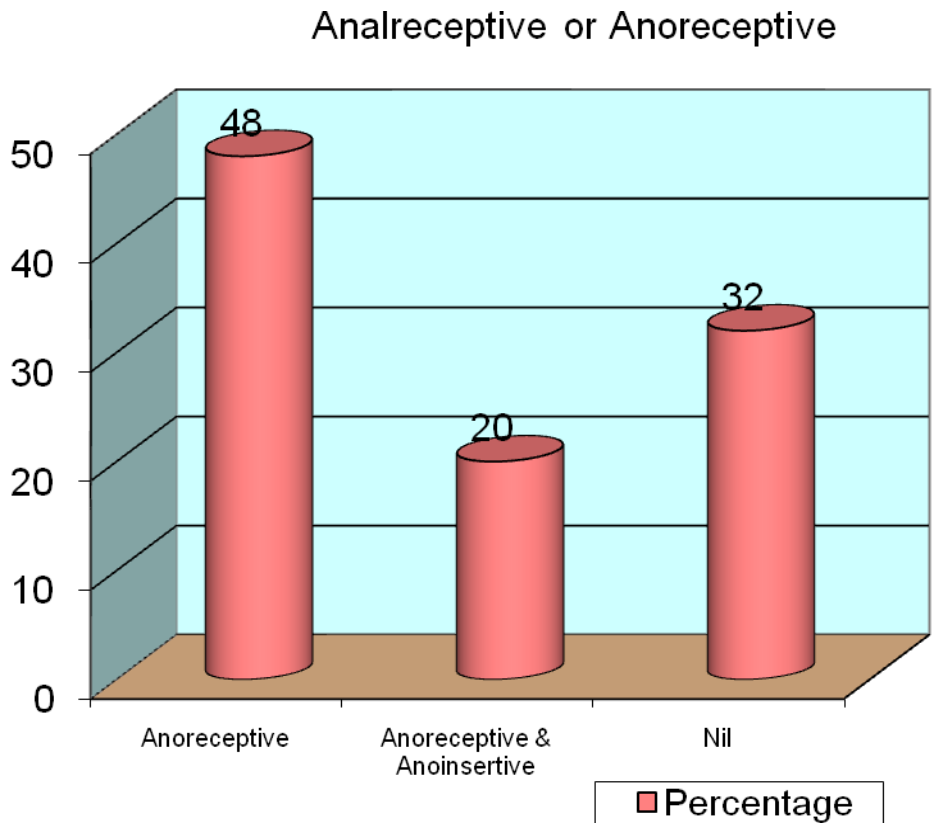
	No.of cases	%
Oro receptive	32	64
Oro receptive and oro insertive	18	36
Total	50	100



Anal receptive/ insertive contact

Out of 50 cases enrolled in our study, 24(48%) cases had only ano receptive contact, 10(20%) cases had both ano receptive and ano insertive contact. And 16 (32%)cases had no anal intercourse .

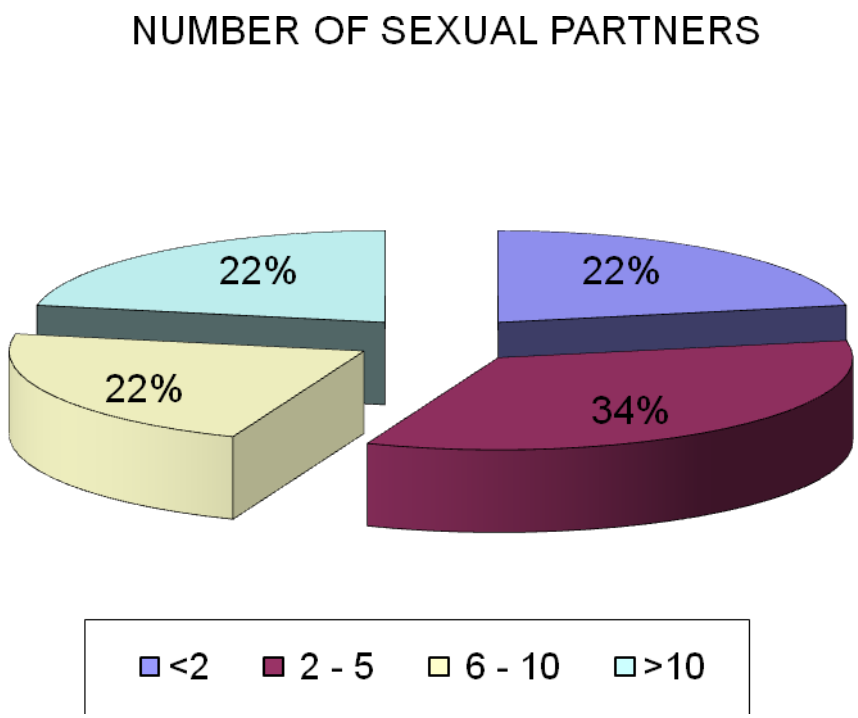
Anal receptive/ insertive	No.of cases	%
Ano receptive	24	48
Ano receptive &Ano insertive	10	20
Nil	16	32
Total	50	100



No of sexual partners in past 3 months

Out of 50 cases enrolled in our study, 34% of cases had 2-5 partners, 22% of cases had more than 10 partners , 22% had 6-10 partners and 22% had less than 2 partners .

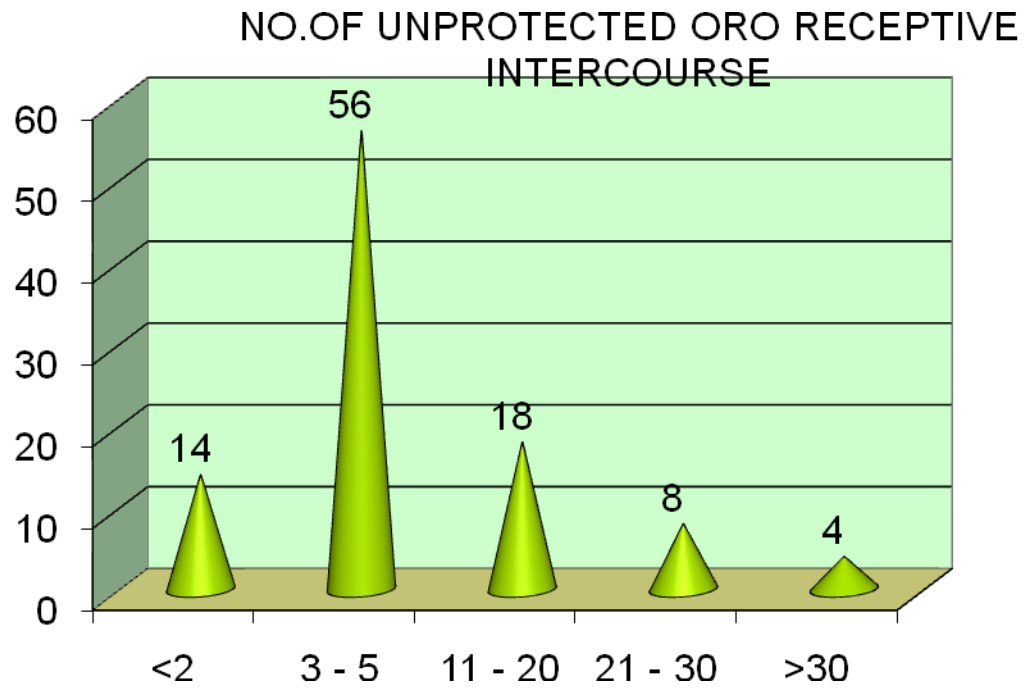
No of sexual partners	No.of cases	%
<2	11	22
2 - 5	17	34
6 - 10	11	22
>10	11	22
Total	50	100



No of unprotected oro receptive intercourses in past 3 months

Out of 50 cases enrolled in our study, 56% of cases had 3-5 unprotected oro receptive intercourse s, 18% of cases had 11-20 unprotected oro receptive intercourses, 14% of cases had less than 2 unprotected oro receptive intercourses , 8% had 20-30 unprotected oro receptive intercourses and 4% of cases had more than 30 unprotected oro receptive intercourses in past 3 months.

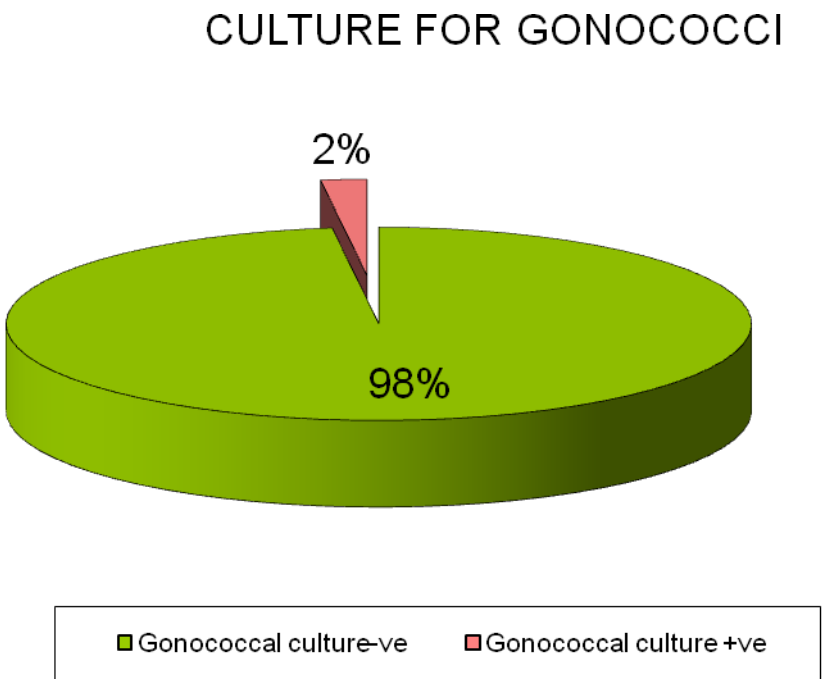
No of unprotected oro receptive intercourse	No.of cases	%
≤2	7	14
3 - 5	28	56
11 - 20	9	18
21 - 30	4	8
>30	2	4
Total	50	100



Pharyngeal Culture for gonococci

Out of 50 cases enrolled in our study, one case showed culture positive for Gonococci in pharyngeal swab which was 2% and 98% showed culture negative for Gonococci.

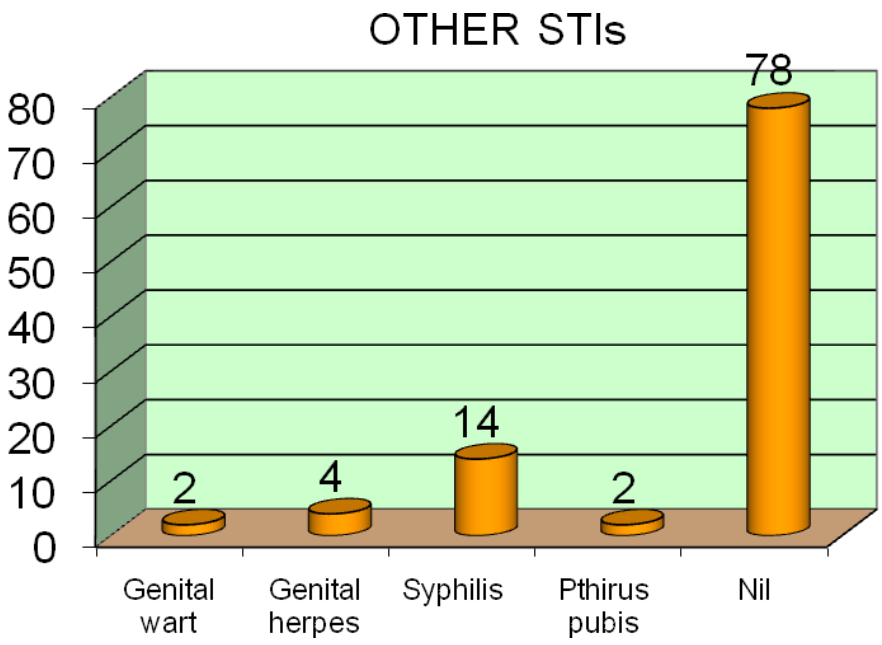
Culture for gonococci	No.of cases	%
Gonococcal culture-ve	49	98
Gonococcal culture +ve	1	2
Total	50	100



Other STIs

Out of 50 cases enrolled in our study most common STIs are syphilis 14% , genital herpes 4%, genital wart and pthirus pubis were each 2%.

Other STIs	No.of cases	%
Genital wart	1	2
Genital herpes	2	4
Syphilis	7	14
Pthirus pubis	1	2
Nil	39	78
Total	50	100



DISCUSSION

Demographic characteristics of study participants

Age

Out of 50 cases of MSM with ororeceptive contact in past 3 months who participated in our study , the most common age group observed is 21-30 years (54%), followed by age group of 31-40 years (20%).

It is similar to study conducted by Jiddou et al[147] where the mean age group was 29.2 years.

It is contrast to the studies conducted by Morris et al[148] where the most common age group is 30-44years(58%).

Sex distribution

Out of 50 cases enrolled in our study, 90% were males and remaining 10% were transgenders , who were not undergone castration.

Transgenders or Alis are those group of people who are often stigmatized and they use sex for living. Transgenders are considered as an important group in the transmission of sexually transmitted infections and HIV.

Occupation

Out of 50 cases enrolled in our study 22% were coolie, followed by that 16% were doing business, 14% were office workers and another 14% were students and 10% of cases are involved in prostitution . Remaining were Artist, Cook , Farmer, Tailor, working in Foreign, Plumbers, Officer workers, Sales executives and Not working.

In the above said group the most common people involved in oro receptive intercourse are coolie , who belong to low socioeconomic group.

In the above said group students are very important in transmitting sexually transmitted infections among their friends in colleges and schools. A survey showed that 7 % of male college students in Chennai had their first sexual experience with another male[130].

In the above said group those people involved in prostitution (male sex workers) , transmit HIV and sexually transmitted infections among their partners. These group of people should undergo routine screening for STIs and HIV.

Marital status

Out of 50 cases enrolled in our study 14% were married and 86% were unmarried .

A married, self-identified heterosexual male, may still engage in sexual activity with other men , such a person could be categorized as an MSM. They may transmit sexually transmitted infections to their female partners.

Sexuality

Out of 50 cases enrolled in our study, 80% were homosexuals and 20% were bisexuals, engaging in sex with both men and women.

In most of the cases, it is the bisexual behavior, which is commoner than isolated homosexual behavior [122].This bisexual behavior makes MSM a bridge population for the spread of sexually transmitted diseases and HIV. These people may transmit the infections to their female partners.

Mode of sexual practice

Oral sex

Out of 50 cases enrolled in our study , 32 (64%) cases had only ororeceptive contact and 18 cases (36%) had both oro receptive and oro insertive contact.

Many men who engage in oral sex believe that they were practicing safe sex. Because the risk of HIV transmission through oral sex is much lower than during anal or vaginal sex, persons might wrongly consider that unprotected oral sex is safe. Current screening guidelines recommend screening for pharyngeal gonorrhea among MSM who report to have receptive oral sex annually.

Anal sex

Out of 50 cases enrolled in our study, 24 (48%) cases had only ano receptive contact,10 (20%) cases had both ano receptive and ano insertive contact. And 16 (32%) cases had no anal intercourse.

Number of unprotected oro receptive intercourse in past 3 months

Out of 50 cases enrolled in our study, 56% of cases had 3-5 unprotected intercourses, 18% of cases had 11-20 unprotected intercourses, 14% of cases had less than 2 unprotected intercourses , 8% of cases had 20-30 unprotected intercourses and 4% of cases had more than 30 unprotected intercourses in past 3 months.

No of sexual partners in past 3 months

Out of 50 cases enrolled in our study, 34% of cases had 2-5 partners, 22% of cases had more than 10 partners , 22% had 6-10 partners and another 22% had less than 2 partners in past 3 months.

It is similar to the study conducted by Jiddou et al [147] where the mean number of partners in past 2 months were 3.55.

Prevalence of pharyngeal gonorrhea

Out of 50 cases enrolled in our study, one case showed culture positive for Gonococci and 98% showed culture negative for Gonococci. The prevalence of pharyngeal gonorrhea among MSM with ororeceptive contact in past 3 months noted in our study was 2%.

It was similar to the Indian study conducted by Vandana et al[150] where the prevalence of pharyngeal gonorrhea was 1.09%.

It was contrast to the study conducted by Morris et al[148] where prevalence of pharyngeal gonorrhea positive was 5.5%.

It was contrast to the study conducted by Jiddou et al[147] where prevalence of pharyngeal gonorrhea positive was10.9%.

It was contrast to the study conducted by Faiza Ali et al[151] where prevalence of pharyngeal gonorrhea was 13.11%.

The prevalence of pharyngeal gonorrhea in western studies are higher than Indian studies. This is may be due to lack of routine screening procedures (pharyngeal culture) for MSM in India or may be due to lack of awareness among MSM to visit healthcare centres.

CDC recommends test for pharyngeal infection with N. gonorrhoeae should be done annually in men who had receptive oral intercourse during the preceding year. More frequent screening at 3-6months interval may be indicated for MSM at greater risk, those with multiple or anonymous partners, or those who have sex in conjunction with illicit drug use, or those whose partners participate in these activities.

Other STIs

Out of 50 cases enrolled in our study most common sexually transmitted infections observed are syphilis 14% , genital herpes 4%, genital wart 2% and pthirus pubis were 2%.

It was similar to the Indian study conducted by Taru Garg et al [152] where the most common sexually transmitted infections among MSM was syphilis.

It was similar to the study conducted by Jiddou et al[147] where the most common sexually transmitted infections among MSM was syphilis.

It was contrast to the study conducted by Morris et al[148] where the most common sexually transmitted infections among MSM was chlamydial infection.

Summary

Out of 50 cases enrolled in our study , one case was found to be pharyngeal gonorrhea positive . Prevalence of asymptomatic pharyngeal gonorrhea among Men who have sex with Men in our study was 2%

- Out of 50 cases of MSM with ororeceptive contact in past 3 months who participated in the study , most common age group observed is 21-30 years (54%), followed by age group of 31-40 years (20%).
- Out of 50 cases enrolled in our study, 90% were males and remaining 10% were transgender.
- Male to transgender ratio was 9:1.
- Out of 50 cases enrolled in our study 22% were coolie, followed by that 16% were doing business, 14% were office workers and another 14% were students and 10% of cases were involved in prostitution . Remaining were Artist, Cook , Farmer, Tailor, working in Foreign, Plumber, Officer workers, Sales executives and Not working.
- Out of 50 cases enrolled in our study 14% were married and 86% were unmarried .
- Out of 50 cases enrolled in our study, 80% were homosexuals and 20% were bisexuals .

- Out of 50 cases enrolled in our study , 32 (64%) cases had only ororeceptive contact and 18 cases 36% had both oro receptive and oro insertive contact.
- Out of 50 cases enrolled in our study, 24 (48%)cases had only anoreceptive contact, 10 (20%) cases had both ano receptive and ano insertive contact. And 16 (32%) cases had no anal intercourse.
- Out of 50 cases enrolled in our study, 56% of cases had 3-5 unprotected intercourses , 18% of cases had 11-20 unprotected intercourses, 14% of cases had less than 2 unprotected intercourses , 8% had 20-30 unprotected intercourses and 4% of cases had more than 30 unprotected intercourses in past 3 months.
- Out of 50 cases enrolled in our study, 34% of cases had 2-5 partners, 22% of cases had more than 10 partners , 22% had 6-10 partners and 22% had less than 2 partners in past 3 months.
- Out of 50 cases enrolled in our study most common Sexually transmitted diseases among MSMs are syphilis 14% , genital herpes 4%, genital wart 2% and pthirus pubis were 2%.
- Out of 50 cases enrolled in our study, one case showed culture positive for Gonococci which was 2% and 98% showed culture negative for Gonococci.
- Prevalence of asymptomatic pharyngeal gonorrhea among Men who have sex with Men attending STD op was 2 % in our study

Conclusion

Men who have sex with men are special risk group people , who needs special attention as they are important people involved in transmission of HIV and Sexually Transmitted Infections.

Pharyngeal gonorrhea not only serves as a route of transmission to urethra but also serves as an important risk factor Disseminated gonococcal infection. Pharyngeal gonorrhea also facilitates transmission of HIV. Pharyngeal gonorrhea acts as a source for the development of drug resistant gonococci, which will make treatment of gonorrhea more challenging.

Prevalence of 2% of asymptomatic pharyngeal gonorrhea among Men who have sex with Men noted in our study made us to do routine screening for pharyngeal gonorrhea for MSM patients with ororeceptive contact. Although CDC recommends that all MSMs should be screened for pharyngeal gonorrhea annually , routine screening tests are not performed.

The observations made in our study , made us realise the importance of screening MSM patients for pharyngeal gonorrhea.

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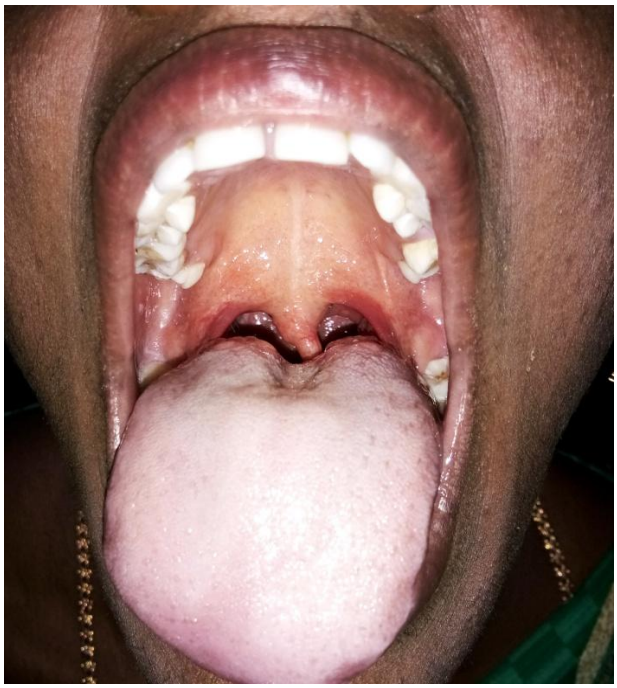
MSM - Pharyngeal swab

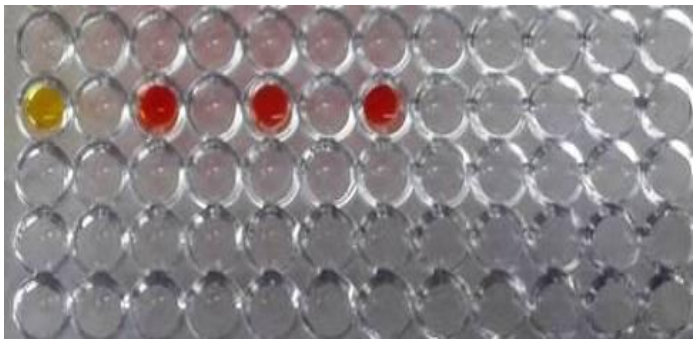
Direct inoculation of pharyngeal swab in culture medium (chocolate agar)

Oral mucosa in culture positive pharyngeal gonorrhea transgender

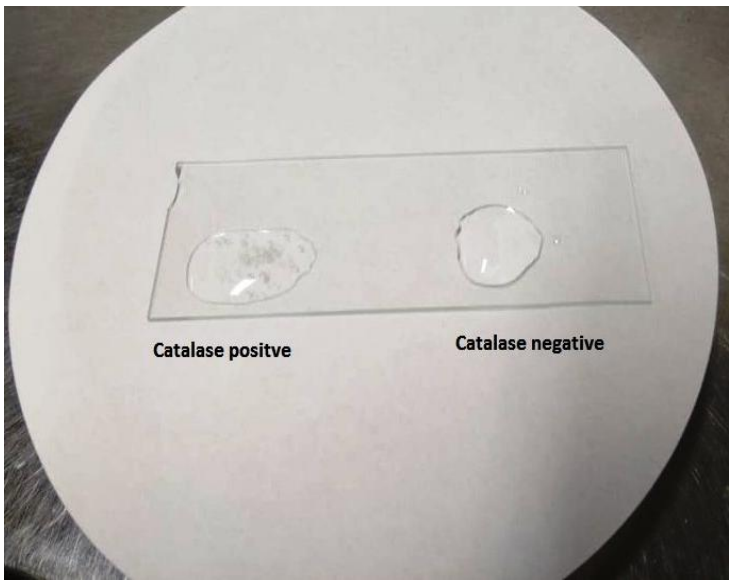


24 hours of incubation showing small pinpoint white smooth translucent raised convex colonies

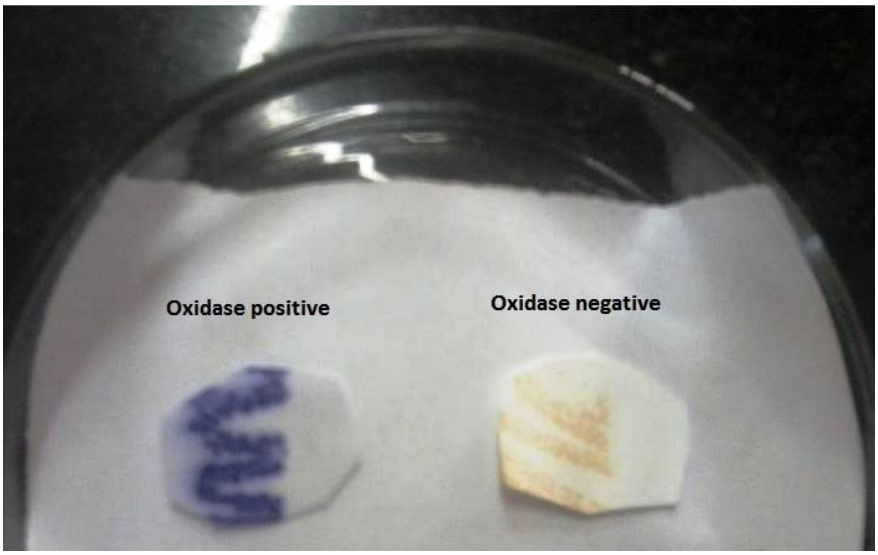
Colonies undergone Carbohydrate fermentation test shows N. gonorrhoeae ferments only glucose



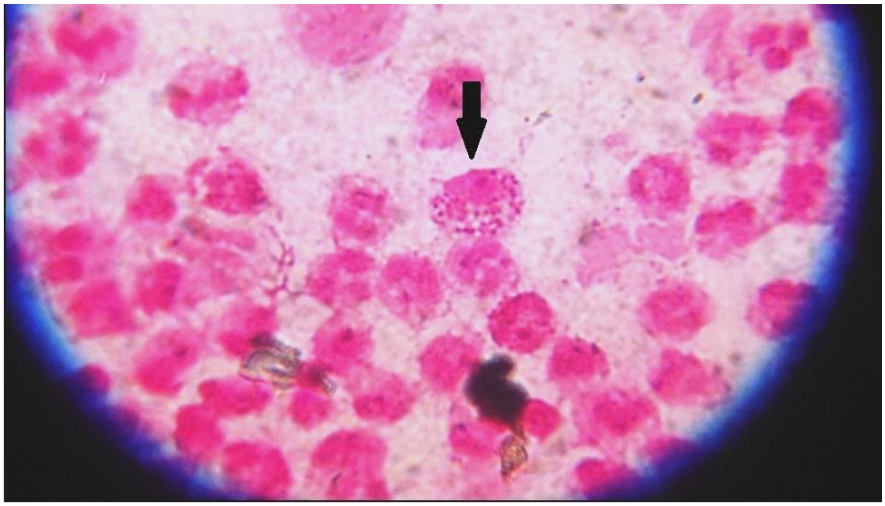
Colonies undergone catalase test



Colonies undergone shows oxidase test



Gram stain shows intracellular gonococci



PROFORMA

Name : Age: MVD NO:

Address with phone number:

Occupation:

PRESENTING COMPLAINTS :

HISTORY :

H/O of sore throat in past 3 months Yes/No

H/O of difficulty in swallowing Yes/No

H/O of fever Yes/No

H/O of joint pain Yes/No

H/O of skin lesions Yes/No

H/O of urethral discharge Yes/No

H/O of dysuria Yes/No

H/O of increased frequency of micturition Yes/No

H/O of genital ulcer Yes/No

H/O of pain on defecation Yes/No

H/O of passing blood or pus in stool Yes/No

H/O of drug intake in past 3 months (antibiotic) Yes/No

H/O of IV drug abuse Yes/No

H/O of previous venereal diseases Yes/No

H/O of previous surgery Yes/No

H/O of blood transfusion Yes/No

PAST H/O:

DM

HTN

TB

Asthma

Epilepsy

PERSONAL H/O:

Alcoholic

Smoker

Diet

MARITAL H/O:

Married /Unmarried

SEXUAL H/O:

Homosexual / Heterosexual / Bisexual

Recent exposure - days back PMC/EMC/MSM

Oral –receptive/insertive Anal-receptive/insertive

Paid /unpaid known/unknown protected/unprotected

No .of sexual partners in past 3 months –

No of unprotected oral intercourse in past 3 months-

Area -

GENERAL EXAMINATION:

Built and nourishment	Afebrile	Anemia	Icterus
clubbing	cyanosis	lymphadenopathy	Pedal edema

VITALS:

Pulse rate-

BP-

SYSTEMIC EXAMINATION:

CVS:

RS:

P/A:

CNS:

Genital examination :

Circumcised /Uncircumcised

Penis –ulcers/scars

Urethral discharge- Yes/No

Scrotum –

Testis and cord structures –

Inguinal lymph nodes-

Skin –

Bones and joints –

Anal and perianal region-

Oral examination :

Buccal mucosa-

Tongue –

Gingiva–

Teeth –

Pharyngeal wall congestion Yes/No

Tonsillar crypts congestion Yes/No

Investigations :

1.Routine blood investigations

CBC	RFT	LFT
Hb-	RBS-	serum bilirubin-
TC-	Blood urea-	T- D- I-
DC-	Serum creatinine-	SGOT-
ESR-		SGPT-
Platelet-		ALP-

2.Pharyngeal swab for culture – positive/negative

3.Gram stain from pharyngeal wall- positive/negative

4.RPR- reactive /non reactive

5.HIV- reactive /non reactive

Treatment : given/not given

Follow up

ஆராய்ச்சிஒப்புதல்படிவம்

bjhz;il bfhnzhhpah (nkfk; btl;il) bjhw;W gw;wpa Muha;r;rp

பெயர்: தேதி:

வயது: உள்நோயாளிஎண்:

பால்: ஆராய்ச்சிசேர்க்கைஎண்:

இந்த ஆராய்ச்சியின் விவரங்களும் அதன் நோக்கங்களும் முழுமையாக எனக்கு விளக்கபட்டது.

எனக்கு விளக்கபட்ட விஷயங்களை நான் புரிந்துகொண்டு எனது முழு மனதுடன் சம்மதிக்கிறேன்.

இந்த ஆராய்ச்சியில் பிறரின் நிர்பந்தமின்றி என் சொந்தவிருப்பத்தின்பேரில் தான் பங்குபெறுகிறேன் மற்றும் நான் இந்த ஆராய்ச்சியில் இருந்து எந்த நேரமும் பின்வாங்கலாம் என்றும் அதனால் எந்த பாதிப்பும் எனக்கு ஏற்படாது என்பதையும் புரிந்துகொண்டேன்.

நான் என்னுடைய சுயநினைவுடன் மற்றும் முழுசுதந்திரத்துடன் இந்த மருத்துவ ஆராய்ச்சியில் பங்கு கொள்ளசம்மதிக்கிறேன்.

ifbahg;gk;

MASTER CHART

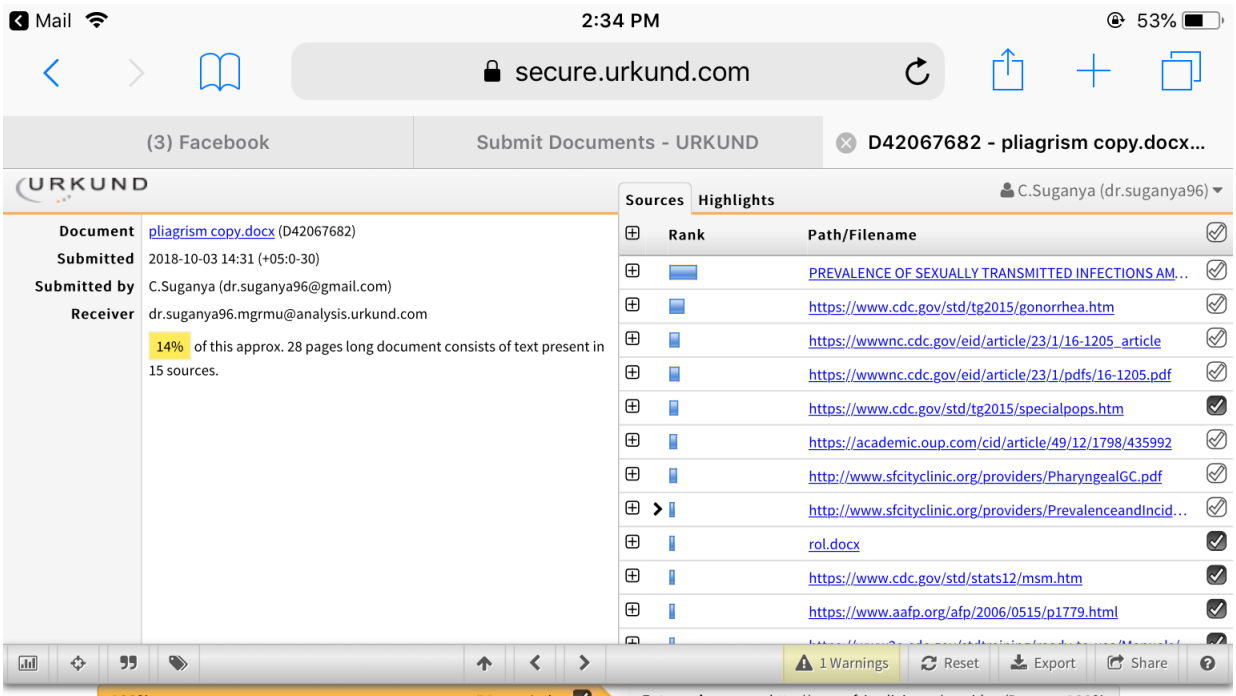
S.No	Name	Age	Sex	Occupation	Marital status	Sexuality	Oral Receptive / insertive	Anal receptive/ insertive	No of partners	No of unprotected intercourse	Culture for gonococci	Other STIs
1	Vinoth	23	M	St	Un	Hm	Or	Ar	10	10	Gn	-
2	Madhuvel	26	TG	Pr	Un	Hm	Or	Ar	25	25	Gp	-
3	Mahendramani	29	M	Bs	Un	Hm	Or Oi	Ar Ai	10	15	Gn	He
4	Pravinkumar	28	M	Sa	Un	Hm	Or Oi	Ar Ai	3	6	Gn	
5	Muthukumar	24	M	Co	Un	Hm	Or Oi	Ar Ai	2	5	Gn	
6	Sanjana	20	TG	Pr	Un	Hm	Or	Ar	20	30	Gn	Ls
7	Boomika	22	TG	Pr	Un	Hm	Or	Ar	3	3	Gn	Ls
8	Chandrika	24	TG	Pr	Un	Hm	Or	Ar	15	15	Gn	
9	Prabhu	47	M	Co	Ma	Bi	Or		6	6	Gn	Ls
10	Raju	26	M	Of	Un	Hm	Or	Ar	1	5	Gn	
11	Jothesh	26	M	Nw	Un	Hm	Or Oi	Ar Ai	3	3	Gn	
12	Karthigaiselvam	27	M	St	Un	Hm	Or Oi		5	5	Gn	
13	Vinoth	24	M	Of	Ma	Bi	Or Oi	Ar Ai	4	3	Gn	Gw Ls
14	Raja mohammed	24	M	Co	Un	Bi	Or Oi	Ar Ai	4	9	Gn	
15	Suvesh	31	M	Fa	Un	Bi	Or	Ar	1	3	Gn	Ls
16	Akshara	19	TG	St	Un	Hm	Or		8	8	Gn	
17	Periyakaruppan	43	M	Fr	Ma	Bi	Or Oi		1	2	Gn	

18	Parameshwaran	30	M	Of	Ma	Bi	Or	Ar	9	9	Gn	
19	Sabari	32	M	Co	Un	Hm	Or	Ar	4	7	Gn	
20	Murugan	40	M	Co	Un	Hm	Or		4	4	Gn	
21	Soonai	20	M	Pl	Un	Hm	Or	Ar	1	1	Gn	Ls
22	Palpandi	23	M	Co	Un	Hm	Or	Ar	12	12	Gn	
23	Kannan	24	M	Art	Un	Hm	Or	Ar	10	20	Gn	
24	Thirupathi	48	M	Bs	Un	Hm	Or	Ar	11	11	Gn	
25	Jeyaraj	39	M	Pr	Un	Hm	Or	Ar	30	30	Gn	
26	Palanikumar	38	M	Ck	Un	Hm	Or	Ar	15	3	Gn	Ls
27	Pandiyarajan	36	M	Bs	Ma	Bi	Or Oi		3	5	Gn	
28	Saravanakumar	28	M	Bs	Un	Hm	Or Oi		1	1	Gn	
29	Thirupathi	33	M	Bs	Un	Hm	Or Oi	Ar Ai	4	4	Gn	
30	Karthick	20	M	Of	Un	Hm	Or Oi		4	4	Gn	
31	Murugan	39	M	Of	Un	Hm	Or	Ar	11	11	Gn	
32	Pandi	45	M	Co	Un	Hm	Or		1	2	Gn	
33	Muthu	46	M	Bs	Ma	Bi	Or Oi		5	5	Gn	He
34	Gandhi	22	M	St	Un	Hm	Or	Ar	10	50	Gn	
35	Vishnupriyan	29	M	St	Un	Hm	Or	Ar	1	2	Gn	
36	Roopan	26	M	Bs	Un	Hm	Or	Ar	4	4	Gn	Pe
37	Ajith	22	M	Of	Un	Hm	Or Oi		4	15	Gn	
38	Muthu	46	M	Bs	Un	Bi	Or Oi	Ar Ai	2	5	Gn	
39	Pandi	22	M	Co	Un	Hm	Or	Ar	10	10	Gn	
40	Surya	25	M	Co	Un	Hm	Or		12	12	Gn	

41	Saravanan	21	M	St	Un	Hm	Or Oi	Ar Ai	1	5	Gn	
42	Mathan	43	M	Co	Un	Hm	Or		1	1	Gn	
43	Shanmuganathan	26	M	Fr	Un	Hm	Or Oi	Ar Ai	6	6	Gn	
44	Abubacket	38	M	Ta	Un	Hm	Or	Ar	10	30	Gn	
45	Shankar	25	M	Of	Un	Hm	Or		30	70	Gn	
46	Shakthiganesh	26	M	Co	Un	Hm	Or		10	10	Gn	
47	Saravanan	19	M	-	Un	Hm	Or	Ar	12	12	Gn	
48	Kannan	49	M	Fa	Un	Hm	Or Oi		1	1	Gn	
49	kalimuthu	40	M	Ck	Ma	Bi	Or	Ar	5	5	Gn	
50	Vaseegaran	23	M	St	Un	Hm	Or	Ar	1	3	Gn	

KEY TO MASTERCHART

M	-	Male	F	-	Female	TG	-	Transgender
St	-	Student	Pr	-	Prostitution			
Bs	-	Business						
Of	-	office worker						
Pl	-	plumber						
Sa	-	Sales executive						
Co	-	coolie						
Ck	-	cook						
Fa	-	Farmer						
Fr	-	foreign						
Ta	-	Tailor						
Art	-	Artist						
Nw	-	Not working						
Ma	-	Married	Un	-	Unmarried			
Hm	-	homosexual	Ht	-	Heterosexual			
Bi	-	Bisexual						
Or	-	ororeceptive						
Oi	-	oroinsertive						
Ar	-	Anoreceptive						
Ai	-	Anoinsertive						
Gp	-	Gonococcal culture +ve						
Gn	-	Gonococcal culture-ve						
Ls	-	Latent syphilis						
Pe	-	pthirus pubis						
He	-	genital herpes						



The symptoms are usually mild or absent in 90% of cases. In few instances acute tonsillitis or pharyngitis may occur.

Pharyngeal gonorrhea is most often asymptomatic, with no significant relationship with sore throat symptoms.

Pharyngeal gonorrhea is far more prevalent than rectal or

urethral gonorrhea. Pharyngeal gonorrhea may be a risk factor for developing Disseminated gonococcal infection. Pharynx is also be the reservoir of antimicrobial resistant gonococci.

Men having sex with men and Gonorrhea

Men having sex with men (MSM) are one of the high

risk group targeted by National AIDS Control Organisation (NACO) to reduce human immunodeficiency virus (HIV) transmission. NACO estimates that India is home to 2.5 million MSM[3] of which 1,00,000 are at high risk of contracting HIV due to multipartner and commercial sexual practices. Already, 15% of this community is infected with this disease.

Only few Indian studies have looked into pattern of STI among Men having sex with men . In contrast, large numbers of studies on STD profile of Men having sex with men are present from the western world.

In most of the cases, bisexual behaviour is commoner than isolated homosexual behaviour. This bisexual behaviour makes MSM a bridge population for spread of

STDs and HIV. The National AIDS Control Organisation (NACO) also provides STI treatment guidelines including syndromic management for the general population and presumptive treatment for high risk groups like Men having sex with men. Men having sex with men are now increasingly being recognised in India as a group ,who are at increased risk for HIV and other STIs.

The most common STDs recorded in Men having sex with men are syphilis (27%) Condyloma Accuminata (21%), Herpes genitalis (19%) and Gonococcal infection (11%) .Gonococcal infections are the fourth most common STD among Men having sex with men. In one Indian study asymptomatic Men having sex with men are screened for gonorrhea at 3 sites urethral, pharyngeal and rectal. The results were 44% urethral , 71% pharyngeal and 88% rectal swabs were positive for gonorrhea

Urkund Analysis Result

Analysed Document:	pliagrism copy.docx (D42067682)
Submitted:	10/3/2018 11:01:00 AM
Submitted By:	dr.suganya96@gmail.com
Significance:	14 %

Sources included in the report:

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Instances where selected sources appear:

51

CERTIFICATE – II

This is to certify that this dissertation work titled "The Prevalence of asymptomatic pharyngeal gonorrhea among Men who have sex with Men attending STD op at Government Rajaji hospital, Madurai" of the candidate Dr.C.Suganya with registration number 201630102 for the award of M.D degree in the branch of Dermatology , Venereology and Leprosy. I personally verified the urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows fourteen percentage of plagiarism in the dissertation.

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with seal.

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.Suganya. C
Course	:	PG in MD., DVL
Period of Study	:	2016 - 2019
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Prevalence of asymptomatic pharyngeal Gonorrhea among men who have sex with men attending STD OP at Govt. Rajaji Hospital, Madurai
Ethical Committee as on	:	11.09.2017

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary

Chairman
Prof Dr V Nagaraajan
M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon)
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